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TECHNICAL REPORT TR 2-80

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March 1980

Directorate of Studies and Analysis
US Army Combined Arms Studies and Analysis Activity
Fort Leavenworth, Kansas 66027

AMMUNITION RESUPPLY MODEL

VOLUME II

PROGRAMMERS MANUAL

by
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ACN 36801

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report is one of two, produced to document the Ammunition Resupply Model (ARM). The model was designed to simulate those activities associated with ammunition resupply-demand, reload, resupply-in parallel with the play of the Jiffy war game in the evaluation of a division size force. The purpose of ARM is to assess the capability of a given TOE structure to respond to logistical demands placed upon it by various numbers of ammunition-expending weaponry. The other volume of the report is the Methodology and Users Manual which a discussion of model methodology, data base development, interface requirements with the war game, and the operators guide.

ABSTRACT

ARM (Ammunition Resupply Model) is an interactive/batch representation of Class V flow from the corps support area (CSA) to the weapon. The model receives a file consisting of a record of ammunition usage by unit by ammunition type from a combat simulation (presently, the simulation being used is METRO). The ARM using a preloaded data base of ammunition handling procedures and capabiliites represents the flow of ammunition as it would have occurred within the battle. The unit status over time is indicative of the capability of the system to supply ammunition to the weapons and the reasonableness of the firing doctrine used within the attrition simulation given the ammunition resupply system carrying capabilities.

ARM is written in FORTRAN IV and is machine independent with the exception of the subroutine that reads the file created by the attrition model.

FOREWARD

In general, existing logistics models tend to address resupply requirements in aggregated terms, such as tons per man per day or rounds per tube per day. Although this approach has considerable merit for evaluating large force structures engaged in sustained combat, it is inadequate for addressing the impact of logistics on organizations engaged in short, intense conflict scenarios.

Ammunition expenditures emerging from high level (as opposed to high resolution) war games have traditionally been either unconstrained or based on a percentage of an "anticipated" daily resupply capability. Because of this, support analyses have not been the product of a concurrent logistics simulation utilizing the same scenario, but have been based on evaluations made after game completion. This method can paint a false picture of a combat unit's effectiveness. The logistics system, especially its ability to resupply critical commodities such as ammunition and fuel, must be evaluated during the course of the simulated battle.

The study directive for the Division-86 study called for a Force Structure Trade-off Analysis (FSTA) of various division alternatives. The tool for this FSTA effort was the Jiffy war game. To derive meaningful insights into the effects of the ammunition resupply assets contained in the different force structures and their impact on the combat effectivensss of the various units within the division, ammunition resupply had to be evaluated in some detail. Such an evaluation must include simulating the time-consuming resupply process that places ammunition on individual weapon systems, as well as the movement of the different units' transportation assets to secure additional ammunition. It is this concept that provides the basis for the Ammunition Resupply Model (ARM), a concept that reflects the real-world factors that affect ammunition resupply. ARM was, therefore, developed to work in parallel with Jiffy in conducting a total FSTA of the Division-86 alternatives.

The concept for ARM was developed in Oct-Nov 1978, with the methodology and logic flow charts being completed in Dec 1978. The actual coding of the model was accomplished from Dec 1978 through Feb 1979, and the model was operational in May 1979. This report provides the documentation for the program description and the FORTRAN code listing.

The authors of this report wish to acknowledge Harry Jones of the Model Design, Development and Validation Branch of COA for his assistance in programming several of the operating routines. Our thanks also to Mr. Ken Pickett, Dr. Dave Bash, and Mr. Harvey Taylor of Methodology and Quality Assurance Branch for their help in providing some initial file structure organization and programming logic flow charts. Special thanks are given to Mrs. Elizabeth Etheridge, who served as Technical Editor for this report, and the girls in the Word Processing Center East, who typed the report.

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PROGRAMMERS MANUAL

1. INTRODUCTION

a. This manual is intended for the programmer who has the task of maintaining, transferring, and/or modifying the Ammunition Resupply model (ARM). General information is presented first, followed by more detailed program descriptions.

(1) Paragraph 2 provides a general overview of the program, its developers, users, hardware requirements, and major program components.

(2) Paragraph 3 lists the COMMON blocks and defines the variables in each. Tables show the COMMON blocks used in each subroutine and the cross-indexed list of subroutines using each COMMON block.

(3) Paragraph 4 addresses the subroutine structure of the program. Flow diagrams indicate the principal subroutine linkages, and tables show the calls in each subroutine as well as the cross-indexed list of the calling routines.

(4) The final paragraph provides detailed information on the individual subroutines.

b. Descriptions of the input and output, how the ARM is run, and how the results are used will be found in volume I of the ARM documentation.

2. GENERAL INFORMATION

a. Summary of ARM Operations. ARM is a set of computer routines designed to assist an analyst in studying the ammunition flow from the Corps Support Area (CSA) to the individual weapons. The initial development objective was to provide a methodology for addressing ammunition supply implications of the Divison 86 alternatives. A quick overview of ARM is at figure 1. The main driver routine directs control to five major sections:

o Data Base Modification

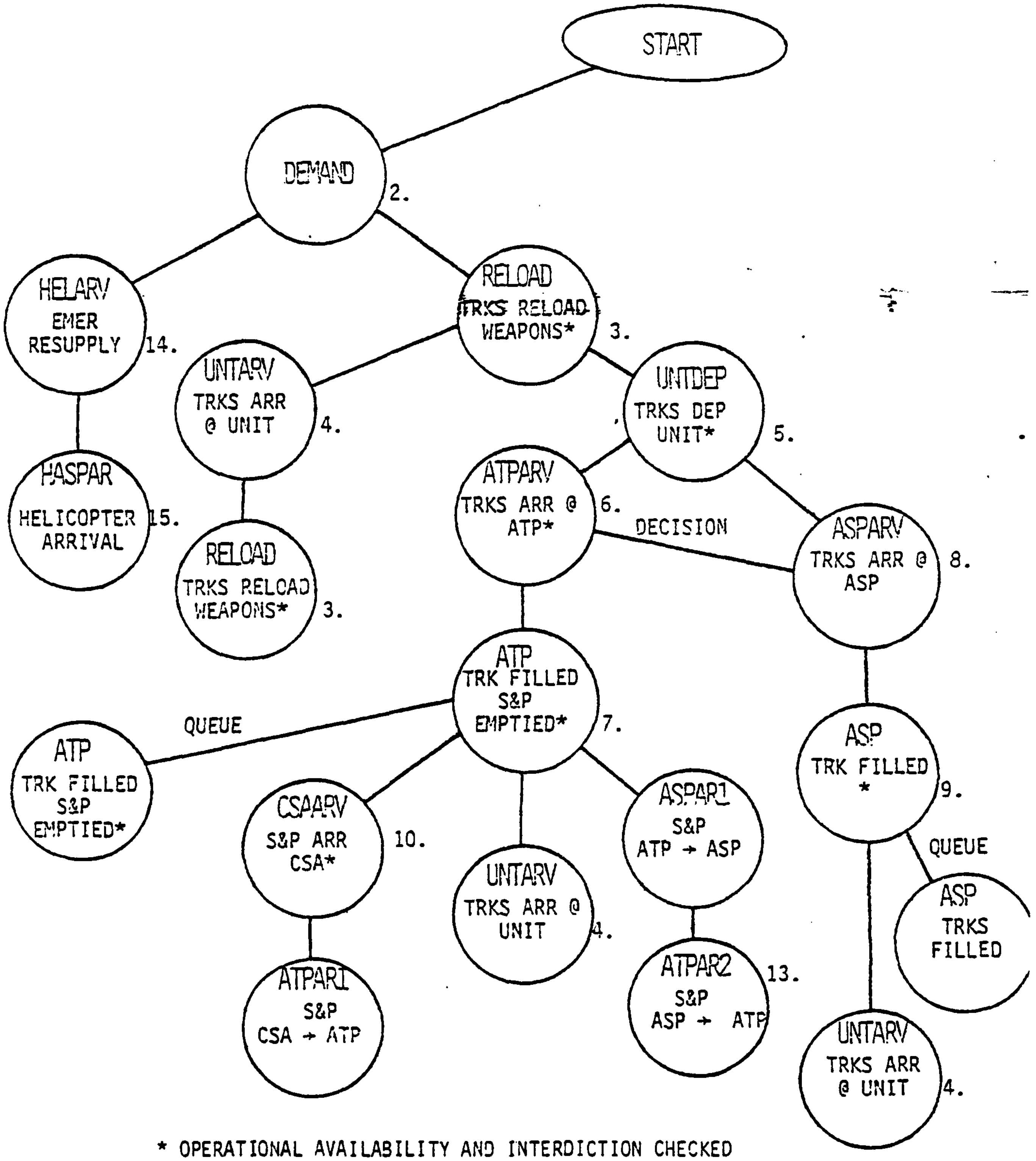
o Event Handling

o Report Production

o Event Processing

o Check Point/Restart Logic

b. Program Developer. ARM was developed by the Combat Operations Analysis Directorate, CACDA, CAC, Fort Leavenworth, for use in the Division 86 study.



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ARM METHODOLOGY

FIGURE 1

c. Program Specifications.

(1) Language and operating system. ARM is written in standard FORTRAN IV, with the exception of a CDC-specific DECODE instruction in subroutine RDJIFF, and currently runs on the CDC 6500 at the TRADOC Data Processing Field Office (DPFO).

(2) Program size. There are 43 subroutines consisting of approximately 3400 lines of code. The program requires a 150 K Octal interactive password to operate.

(3) Execution times. The model has been tested with a brigade set of units and requires 8 seconds of computer time to process the input resulting from a JIFFY-produced 4 hours of engagement. A division set of units requires less than 15 seconds of computer processing.

(4) Program input. Program input comes from the following sources.

(a) File T1, which contains the data base of ammunition system characteristics and unit ammunition basic requirements.

(b) File T2, which contains the impending events, if any, from the previous run.

(c) File T3, ammunition usage file created by an attrition model.

(d) Input, supplied by the operator during the run, which is of three types:

1. Yes/No answers to select program options.

2. New values for specific run parameters.

3. Requests for desired reports.

(5) Program output. There are three types of program output:

(a) At his request the operator can elect to print a step by step processing of the model.

(b) The data base can be displayed in part or in total.

(c) Reports can be generated at operator-specified control points in the processing to display the system status.

d. Operating Environment. ARM requires an interactive terminal with a printer and/or CRT. Output can be routed to a highspeed printer.

3. COMMON BLOCKS IN ARM. Two programming methods are used to transfer data among the ARM subroutines:

- o Arrays and variables are passed in the subroutine calling sequence.
- o Arrays and variables are stored in the COMMON blocks.

a. Composition of COMMON Block. The use of labeled or named COMMON blocks makes it possible to make available to each subroutine only those variables it uses. For quick reference, table 1 lists the arrays and single variables making up each ARM COMMON block. Definitions of those arrays and variables are given in table 2, and table 3 lists some additional data and codes.

b. COMMON Block Usage in ARM. Table 4 lists the COMMON blocks used by each ARM subroutine. Table 5 cross-indexes this information, showing the subroutines using each COMMON block.

Table 1. Composition of the ARM COMMON Blocks

Block Name	Variables
EVENTS	JSTAT(6), JEVDS(1024,4), IEVS(5,1024)
LOG	IATP(4,30), IASP(4,41),
	IUNIT(75,69), ITRUCK(560,7),
	ITYPE(6,6), IMIX(40,23), INTER(9),
	IRSTME(20,3), IATPSD(5),
	IDAY, TIME, ICSA(20), LPPAR(5)
	IASPAM(4,20), LUOUT, TCIST,
	TCILNG, LOOK(17)
QUENUM	IHEAD(136)
QUEPNT	ITEMS(560)

Table 2. Definitions of the COMMON Arrays and Variables

COMMON Blocks	Variables
EVENTS	: Event handler.
	JSTAT(I)
	I=1, - Pointer to the first event chronologically
	I=2, - Pointer to the last event chronologically
	I=3, - Pointer to the next empty record to place an event
	I=4, - Total number of events presently in storage
	I=5, - Number of additional events that can be placed in storage
	I=6, - Total number of events that can be placed in storage.
	JEVDS (I,J)
	I=1-1024,- Event position-in-storage index
	J=1, - Pointer to the position of the next event
	J=2, - Pointer to the position of

Table 2 (continued)

J=18, - Basic ammo level, ammo 1
J=19-21, - Ammo 2
J=22-24, - Ammo 3
J=25-27, - Ammo 4
J=28-30, - Ammo 5

IASP(I,J)

I-1-4, - Data sets for (ASP) one through four.
J=1, - Distance to CSA
J=2, - Distance to ATP
J=3, - UTM Coordinate
J=4, - Empty
J=5, - Number trucks to CSA
J=6, - A flag that = 0 if the routine queue has not served a truck this war, 1 otherwise
J=7, - Number routine servers active
J=8, - Number GSRS servers active
J=9, - Routine queue number
J=10, - GSRS queue number
*J=11, - A flag that = 0 if the GSRS queue has not served a truck this war, 1 otherwise
J=12, - Number trucks in routine queue
*J=13, - Number trucks in GSRS queue
J=14, - Current ammo supply, ammo 1
J=15,33 - Ammo 2 - Ammo 20
J=34,41 - Empty

IUNIT (I, J)

I = 1 - 75, - Contains the data sets for units numbered 1 to 75.
J=1, - Type Unit
J=2, - ATP number
J=3, - ASP number
J=4, - Distance to ATP in Km
J=5, - Distance to ASP in Km
J=6, - UTM coordinate
J=7, - Jiffy unit name
J=8, - First ammo type
J=9, - Number weapons alive, First ammo type
J=10, - Number weapons short ammo, First ammo type
J=11, - Number rounds short, (Wpns) First ammo type
J=12, - Current ammo supply, (Wpns) First ammo type
J=13, - Routine resupply level, (Per Wpn) First ammo type
J=14, - Critical resupply level, (Per Wpn) First ammo type

*Note: Not used since each GSRS truck has its own crane and does not wait in queue.

Table 2 (continued)

J=15, - Basic ammo level, (Per Wpn) First ammo type
J=16, - Ammo on trucks, First ammo type
J=17, - Number of weapons killed in CI, First ammo type
J=18, - Number of weapons short ammo, First ammo type
J=19, - Total rounds short through whole CI, First ammo type
J=20-31, - Second ammo type
J=32-43, - Third ammo type
J=44-55, - Fourth ammo type
J=56-67, - Fifth ammo type
J=68, - Number of helicopters assigned
J=69, = 0 If single pulse demand per CI
= 1 If multiple pulses per CI
= N

Table 2 (continued)

INTER(I)
I=1, - Counter for zone 1 trucks killed in INTRDK
I=2, - Counter for zone 2 trucks killed in INTRDK
I=3, - Maximum number of trucks to be killed in zone 1
I=4, - Maximum number of trucks to be killed in zone 2
I=5, - Time to replace truck interdicted in zone 1
I=6, - Time to replace truck interdicted in zone 2
I=7, - Modulo of trucks to be killed in zone 1 and zone 2
I=8, - Number of zone 1 trucks entering INTRDK
I=9, - Number of zone 2 trucks entering INTRDK

IRSTME (I,J)
I=1-20, - Designates the ammunition type associated with the data set
J=1, - Weapon set-up time in minutes
J=2, - Load time per round in minutes
J=3, - Travel time to weapon in minutes

IATPSD(I)
I=1, - Maximum number of servers at the ATP
I=2, - Threshold 1 for queue 1 at an ATP
I=3, - Threshold 2 for queue 1 at an ATP
I=4, - Threshold 1 for queue 2 at an ATP
I=5, - Threshold 2 for queue 2 at an ATP

IDAY
0, - Night
1, - Day

TIME
Contains the present battle time of the simulation in decimal minutes

ICSA(I)
I=1-20, - Contains the number of rounds by 20 ammunition types, drawn from the corps storage area stock since the beginning of the game.

LPPAR(I)
I=1, - Total number of ammo codes (20)
I=2, - Number of ammo codes at ATP (5)
I=3, - Number of maneuver unit ammo codes at ATP (2)
I=4, - Number of transports(trucks) (LT 560)
I=5, - Number of helicopters available (LT 560)

IASPAM(I,J)
I=1-4, - Designates the ammunition supply point associated with the data set.

Table 2 (concluded)

		J=1-20, - The number of rounds by ammunition type removed from the ammunition supply point
	LUOUT	The logical file for write statements; = 2 if all output to CRT, = 6 if all nonoperator interface output to a local output file
	TCIST	Decimal minutes battle time at the start of current run
	TCILNG	Decimal minutes battle time length of current run.
	LOOK(I)	I=1-17, - Contains print control flag = 1 if want to see all events of type I = 0 if do not want to see events of type I
QUENUM	IHEAD(I)	I=1-136, - Contains the truck number of the first truck to enter queue I that is still in queue I
QUEPNT	ITEMS(I)	I=1-560, - Contains in space I the truck which is next in the same queue as truck I is in

Table 3. ADDITIONAL DATA AND CODES

Ammo Type Codes:

1	105 mm (M60-A3/XM1)
2	TOW
3	Powder Canisters
4	155 HE
5	155 ICMDP
6	155 Smoke
7	155 CLGP
8	8 Inch HE
9	8 Inch ICMDP
10	GSRS
11	Mortars
12	DIVAD
13	Hellfire
14	XR-TOW
15	STINGER
16	DRAGON
17	BUSHMASTER
18	EMPTY
19	EMPTY
20	EMPTY
25	False code for handling TOW vehicles other than the ITV due to differing basic load parameters.

Unit Type Codes:

1	Tank task force
2	Mech task force
3	Armrd cav sqdn
4	155 arty btry
5	8 inch arty btry
6	GSRS btry
7	DIVAD gun plt
8	CBT avn plt

Truck Type Codes:

1	10 ton
2	5 ton
3	5 ton with 1 1/2 ton trailer
4	10 ton w/15 ton trailer
5	22 1/2 ton stake and platform
6	Helicopter, CH 47

Truck Mission Type Codes:

1	Unit truck
2	CSA - ATP link
3	CSA - ASP link
4	ASP - ATP link
5	ASP - Unit (helicopter)

Truck Status Type Codes:

1	In unit queue
2	In ATP queue

3 - In ASP queue
4 - In transit
5 - Unit truck going from ATP to ASP
6 - Truck awaiting repair
7 - Truck dead (interdicted)

QUEUE NUMBER	QUEUE TYPE	QUEUE USE
1-75	1	At each unit
101-104	2	At ATPS for CSA-ATP trucks
105-108	3	At ATPS for ASP-ATP trucks
109-112	4	At ATPS for unit artillery server
113-116	5	At ATPS for unit maneuver server
117-120	6	Not used
121-124	7	At ASPS for CSA-ASP trucks (Not Use
125-128	8	At ASPS for routine server
129-132	9	At ASPS for GSRS server
133-136	10	Not used

Table 4. Use of Common Arrays and Variables by ARM Subroutines

Routine	Arrays/Variables
ARM DRIVER	TIME
ASP	IASP, IASPAM, IDAY, IMIX, ITRUCK ITYPE, IUNIT, LPPAR, TIME
ASPAR1	IASP, IASPAM, IDAY, IMIX, ITRUCK, ITYPE, LPPAR, TIME
ASPARV	IASP, IDAY, IMIX, ITRUCK, TIME
ATP	IASP, IASPAM, IATP, IATPSD, IDAY, IMIX, ITRUCK, ITYPE, IUNIT, LPPAR, LUOUT, TIME
ATPAR1	IATP, IMIX, ITRUCK, LPPAR
ATPAR2	IATP, IMIX, ITRUCK, LPPAR
ATPARV	IATP, IDAY, IMIX, ITRUCK, ITYPE, IUNIT, LPPAR, TIME
CONTRL	
CSAARV	IASP, IATP, ICSA, IDAY, IMIX, ITRUCK, ITYPE, LPPAR, TIME
DEMAND	IASPAM, IATP, ICSA, IDAY, IMIX, ITRUCK, ITYPE, IUNIT, LPPAR, LUOUT, TIME
EDIT	IASP, IASPAM, IATP, IATPSD, ICSA, IDAY, IMIX, INTER, IRSTME, ITEMS, ITRUCK, ITYPE, IUNIT, LOOK, LPPAR, LUOUT, TCILNG, TCIST, TIME
ENDSIM	Writes out log common and queue pointer commons
FINTK	IMIX, ITRUCK, LUOUT
HASPAR	ITRUCK, LPPAR
HELARV	IDAY, IMIX, ITRUCK, ITYPE, IUNIT, TIME
INIT	Reads all log and queue files for restart
INTRDK	INTER, ITRUCK, LUOUT
IQ	None
LDPWDR	IDAY, IMIX, ITRUCK, ITYPE, TIME
LOOKEV	LOOK
OPERA	ITRUCK, ITYPE, LUOUT, TIME
RDIEXO	IUNIT, TCILNG, TCIST, TIME
RDJIFF	IUNIT, LUOUT, TCILNG, TCIST, TIME
READF	None
RELOAD	IASPAM, IMIX, IRSTME, ITRUCK, IUNIT, LUOUT, TIME
REPORT	IASP, IATP, ICSA, ITRUCK, ITYPE, IUNIT, IPPAR, LUOUT
TRKPUT	None
TRKTIM	ITRUCK, ITYPE, LPPAR
UNTARV	IMIX, ITRUCK, IUNIT, LPPAR, TIME
UNTDEP	IDAY, IMIX, ITRUCK, ITYPE, IUNIT, LPPAR, TIME
CREEVT	NONE
EVINIT	Reads unprocessed events from T2 into common events

EVSTOP	Writes unprocessed events onto tape 2 from common event
GETEVT	IEVS, JEVDS, JSTAT
GETQUE	IPNT, NHEAD, (ITEM)(IHEAD)
NEXTEV	None
NXTQUE	None
PUTEVT	IEVS, JEVDS, JSTAT
PUTQUE	IPNT, ITEM, (IHEAD)(NHEAD)
QINIT	IEVS, JEVDS, JSTAT
SCHED	None
SETQUE	IPNT, NHEAD, (ITEM)(IHEAD)

Table 5. Use of COMMON Blocks by the ARM Subroutines

COMMON Array/Variable	Using subroutines
IASP	ASP, ASPAR1, ASPARV, ATP, CSAARV, EDIT, REPORT
IASPAM	ASP, ASPAR1, ATP, DEMAND, EDIT, RELOAD
IATP	ATP, ATPAR1, ATPAR2, ATARAV, CSAARV, DEMAND, EDIT, REPO
IATPSD	ATP, EDIT
ICSA	CSAARV, DEMAND, EDIT, REPORT
IDAY	ASP, ASPARV, ATP, ATPARV, CSAARV, DEMAND, EDIT, HELARV, LDPWDR, UNTDEP
IHEAD	GETQUE, PUTQUE, SETQUE
IMIX	ASP, ASPAR1, ASPARV, ATP, ATPAR1, ATPAR2, ATPARV, CSAARV, DEMAND, EDIT, FINTK, HELARV, LDPWDR, RELOAD, UNTARV, UNTDEP
INTER	EDIT, INTRDK
IRSTME	EDIT, RELOAD
ITEM	GETQUE, PUTQUE, SETQUE
ITRUCK	ASP, ASPAR1, ASPARV, ATP, ATPAR1, ATPAR2, ATPARV, DEMAND, EDIT, FINTK, HASPAR, HELARV, INTRDK, LDPWDR, OPERA, RELOAD, REPORT, TRKTIM, UNTARV, UNTDEP
ITYPE	ASP, ASPAR1, ATP, ATPARV, CSAARV, DEMAND, EDIT, HELARV, LDPWDR, OPERA, REPORT, TRKTIM, UNTDEP
IUNIT	ASP, ATP, ATPARV, DEMAND, EDIT, HELARV, RELOAD, REPORT, UNTARV, UNTDEP
LOOK	EDIT, LOOKEV
LPPAR	ASP, ASPAR1, ATPAR1, ATPAR2, ATPARV, CSAARV, DEMAND, EDIT, HASPAR, REPORT, TRKTIM, UNTARV, UNTDEP
LUOUT	ATP, DEMAND, EDIT, INTRDK, OPERA, RELOAD, REPORT
TCILNG	EDIT, RDIEXO, RDJIFF
TCIST	EDIT, RDIEXO, RDJIFF
TIME	ARM DRIVER, ASP, ASPAR1, ASPARV, ATP, ATPARV, CSAARV, DEMAND, EDIT, HELARV, LDPWDP, OPERA, RDIEXO, RDJIFF, RELOAD, UNTARV, UNTDEP
IEVS	GETEVT, PUTEVT, QINIT, EVINIT, EVSTOP
JEVDS	GETEVT, PUTEVT, QINIT, EVINIT, EVSTOP
JSTAT	GETEVT, PUTEVT, QINIT, EVINIT, EVSTOP

4. PROGRAM STRUCTURE - A MACRO VIEW

a. Purpose of This Report Section. This section provides an overview of the ARM subroutine structure. Information is presented in the following order.

. Outline of main driver routine, with operational flow diagrams.

. Additional description of overall processing

. List of subroutines called by each subroutine

. The cross reference list of the callers of each subroutine

b. Main Program Operations. The basic control program in ARM is the mainline driver PROGRAM ARM. Its principal functions as shown in figure 2 are as follows:

. Initialize the files

. Obtain the next event

. Call in the proper subroutine to process the next event

c. ARM Subroutine Structure.

(1) Major subroutine groups. ARM consists of 43 routines. Table 6 shows the major grouping of routines into the following categories:

. Event storage/retrieval

. Event functional processing

. Support special purpose routines

(2) Subordinate calling pattern in ARM. This review of the ARM structure is completed by the exhibition of the subroutine calling pattern. Table 7 is the list o routines called by each routine. Table 8 is the cross-referenced routines calling th list of routines.

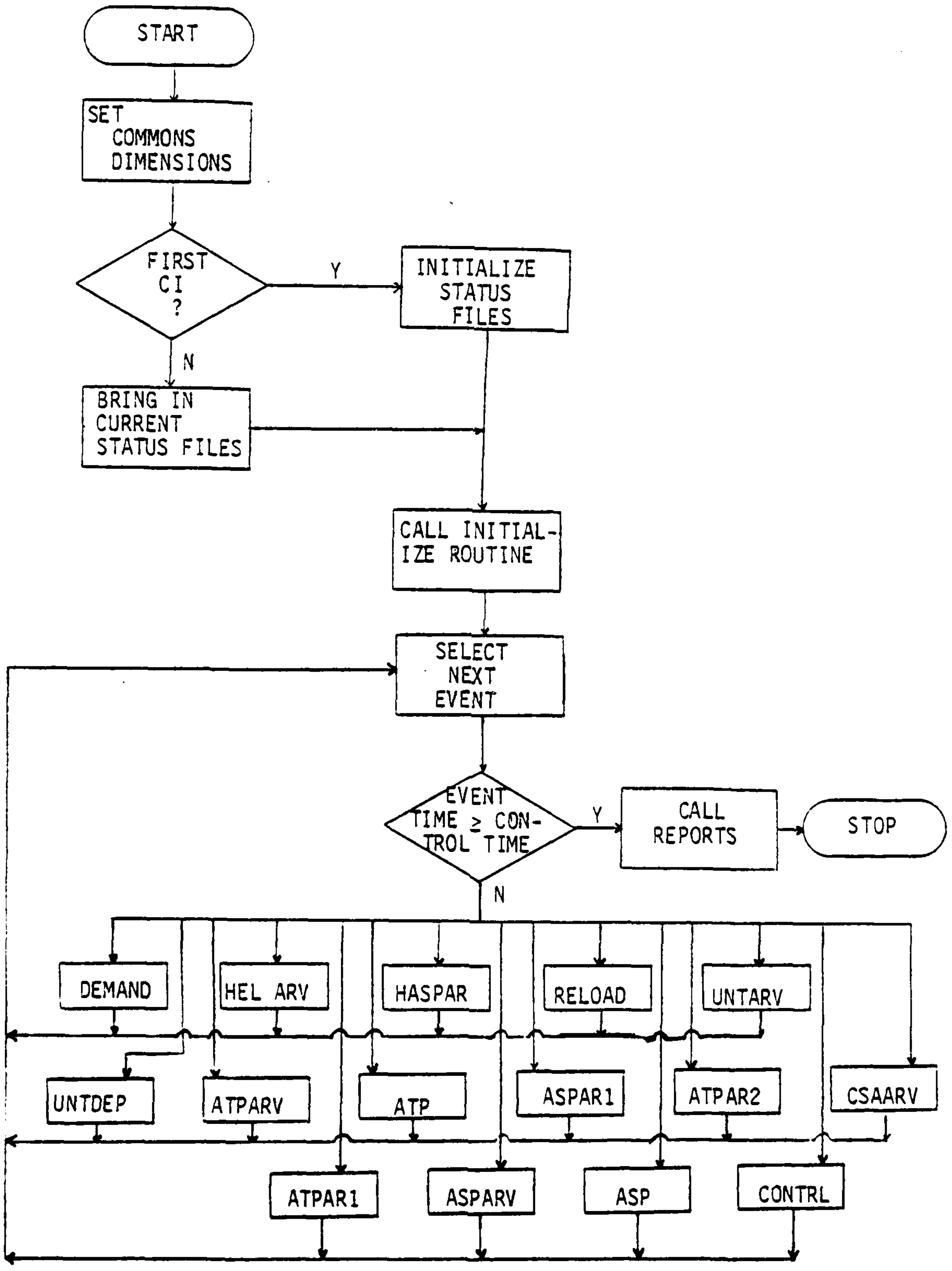

Figure 2. Program Arm

Table 6. Major Grouping of Routines

GROUP	Routines
Event Storage/Retrieval	GETEVT, NEXEVT, PUTEVT
Event Functional Processing	ASP, ASPARV, ASPAR1, ATP, ATPARV, ATPAR1, ATPAR2, CONTRL, CSAARV, DEMAND, ENDSIM, HASPAR, HELARV, RELOAD, REPORT, UNTARV, UNTDEP
Support Special Purpose Routines	CREEVT, EDIT, EVINIT, EVSTOP, FINTK, GETQUE, INIT, INTRDK, IQ, LDPWDR, LOOKEV, OPERA, NXTQUE, PUTQUE, QINIT, RANF, RDIEXO, RDJIFF, READF, SCHED, SETQUE, TRKPUT, RANF, TRKTIM

Table 7. Subroutine Calls in ARM

Program ARM Calls:

- ASP
- ASPARV
- ASPAR1
- ATP
- ATPARV
- ATPAR1
- ATPAR2
- CONTRL
- CSAARV
- DEMAND
- ENDSIM
- EVINTT
- EVSTOP
- HASPAR
- HELARV
- INIT
- LOOKEV
- NEXTEV
- RELOAD
- REPORT
- UNTARV
- UNTDEP

RELOAD Calls:

- FINTK
- INTRDK
- IQ
- MINO
- SCHED

REPORT Calls:

- TRUCK

UNTARV Calls:

- IQ
- PUTQUE
- SCHED

GETQUE Calls:

UNTDEP Calls:

- INTRDK
- OPERA
- SCHED

GETEVT Calls:

- None

NEXEVT Calls:

- GETEVT

PUTEVT Calls:

- None

ASP Calls:

- GETQUE
- INTRDK
- IQ
- OPERA
- SCHED

ASPARV Calls:

- IQ
- PUTQUE
- SCHED

ASPAR1 Calls:

- INTRDK
- OPERA
- SCHED

EDIT Calls:

- READF

EVINIT Calls:

- QINIT

EVSTOP Calls:

- None

FINTK Calls:

- GETQUE
- PUTQUE

INIT Calls:

- CONTRL
- RDJIFF
- SCHED
- TRKTIM

INTRDK Calls:

ATP Calls:

- FINTK
- GETQUE
- INTRDK
- IQ
- LDPWDR
- OPERA
- RDIEXO
- SCHED

ATPAR1 Calls:

- IQ
- PUTQUE

ATPAR2 Calls:

- IQ
- PUTQUE

ATPARV Calls:

- INTRDK
- OPERA
- PTQUE
- SCHED
- SCHED

IQ Calls:

- None

LDPWDR Calls:

- FINTK
- INTRDK
- IQ
- OPERA
- EOF
- SCHED

LOOKEV Calls:

- None

NXTQUE Calls:

- None

OPERA Calls:

- None

CSAARV Calls:

- INTRDK
- OPERA
- SCHED

DEMAND Calls:

- OPERA
- RDIEXO
- SCHED

ENDSIM Calls:

- None

HASPAR Calls:

- None

HELARV Calls:

- OPERA
- SCHED

RDIEXO Calls:

- SCHED

RDJIFF Calls:

- EOF
- SCHED

READF Calls:

- EOF
- FLOAT

SCHED Calls:

- CONTRL
- LOOKEV
- PUTEVT

CONTRL Calls:
  CREEVT
  EDIT
  REPORT
  SCHED
  TRKPUT

CREEVT CALLS:
  READF
  SCHED

TRKTIM Calls:
  RANF

None

TRKPUT Calls:
  GETQUE
  NXTQUE
  PUTQUE
  READF
  SETQUE

PUTQUE Calls:
  None

QUINT Calls:
  None

SETQUE Calls:

None

Table 8. Calling Subroutines in ARM

Routine	Called by
ARM PROGRAM (ARM-P)	NONE
NEXTEV	ARM-P
GETEVT	NEXEVT
PUTEVT	SCHED
ASP	ARM-P
ASPARV	ARM-P
ASPAR 1	ARMY
ATP	ARM-P
ATPARV	ARM-P
ATPAR1	ARM-P
ATPAR2	ARM-P
CONTRL	ARM-P
CSAARV	ARM-P
DEMAND	ARM-P
ENDSIM	ARM-P
HASPAR	ARM-P
HELARV	ARM-P
RELOAD	ARM-P
REPORT	ARM-P, CONTRL
UNTARV	ARM-P
UNTDEP	ARM-P
CREEVT	CONTRL
EDIT	CONTRL
EVINIT	CONTRL
EVSTOP	ARM-P
FINTK	ARM-P
GETQUE	ASP, ATP, FINTK, TRKPUT,
INITD	ARM-P
INTRDK	ASPARV, ATPARV, CSAARV, RELOAD, UNTDEP, LPDWDR
IQ	ASP, ATP, ATPAR1, ATPAR2, RELOAD, LDPWDR, UNTARV
LDPWDR	ATP, ATPARV,
LOOKEV	ARM-P, SCHED
NEXTEV	ARM-P
NXTQUE	TRKPUT
OPERA	ASP, ASPAR1, ATP, ATPARV, CSAARV, DEMAND, HELARV, UNTDEP, LDPWDR
PUTQUE	ASPARV, ATP, ATPARV, ATPAR1, ATPAR2 CSAARV, DEMANDHELARV,
QINIT	EVINIT
RANF	TRKIEM
RDIEXO	ASPAR1, UNTARV, FINTK,
RDJIFF	LDPWDR, TRKPUT
READF	EVINIT, CREEVT
SCHED	EDIT, TRKPUT ASP, ASPARV, ASPAR1, ATP, ATPARV, CSAARV, DEMAND, HELARV, RELOAD, UNTARV, UNTDEP, INIT, LDPWDR, RDIEXO, RDJIFF, CNTRL
SETQUE	TRKPUT
TRKPUT	CONTRL
TRKTIM	INIT
TRUCK	REPORT

5. DESCRIPTIONS OF THE INDIVIDUAL SUBROUTINES. Descriptions of the individual subroutines are given in this section. The following information is given for each routine:

- o Name
- o Purpose
- o COMMON blocks
- o Subroutines called by this routine
- o Subroutines calling this routine
- o Variables in calling sequence
- o Local arrays
- o Subroutine functions

a. ROUTINE: ARM Program-No Parameters

PURPOSE: To control the overall system flow for the ARM

COMMON BLOCKS: LOG
QUENUM
QUEPNT

CALLS:

ASP
ASPARV
ASPAR1
ATP
ATPARV
ATPAR1
ATPAR2
CONTRL
CSAARV
DEMAND
ENDSIM
EVINIT
EVSTOP
HASPAR
HELARV
INIT
LOOKEV
NEXTEV
RELOAD
REPORT
UNTARV
UNTDEP

IS CALLED BY: Operator

CALLING PARAMETERS: NONE

LOCAL ARRAYS:

IPARM(5) -- Storage array for carrying event parameters to the event processing routines.

FUNCTIONS:

Initializes event queues.

Calls INIT to enable setting of parameters for this ARM cycle.

LOOP LOGIC: Retrieves the next chronological event.

Passes control to appropriate routine to process the event.

```
      PROGRAM [illegible] (TAPE1, TAPE2, TAPE3, TAPE4, TAPE7, TAPE8,TAPE9,
     /  INPUT, OUTPUT,TAPE[illegible]=OUTPUT)
C
      COMMON /LOG/ IATR(4,30), IASP(4,41), IUNIT(75,13),
     /  I[illegible]K(560,7), ITYPE(6,6), IMIX(40,23), INTER(3),
     /  IR[illegible](2[illegible],3), IAIP[illegible](5), IDAY, TIME,
     /  ICSA(2[illegible]), LPEAK(6), IASL[illegible](4,23), LUOUT, ICIST, ICILNG, LOOK(17)
      COMMON /QU NUM/ IH[illegible]A0(130)
      COMMON /QUEENT/ IT[illegible](500)
C**** MAIN,  H. [illegible]      DEC 78
C
C**** TAPE1     KEYBOARD
C**** TAPE2     DISPLAY
C**** TAPE3     INPUT DATA , COMMONS LOG, QUENUM, QUEENT
C**** TAPE4     OUTPUT DATA, COMMONS LOG, QUENUM, QUEENT
C**** TAPE7     INPUT DATA, COMMON EVENTS
C**** TAPE8     OUTPUT DATA, COMMON EVENTS
C**** TAPE9     INPUT DATA, JIFFY FILE
C
      DIMENSION IPARM(5)
C
C**** INITIALIZE SIMULATION
      CALL EVINIT
      CALL INIT
C
C**** GET AND PROCESS EACH EVENT
    1 CALL [illegible] (KIND, IPARM, TIME)
      IF(KIND .LT. 1  .OR. KIND .GT. 17) WRITE(2,7) KIND
    7 FORMAT(" EVENT TYPE ",I5," OUT OF RANGE")
      CALL LOOK[illegible] (KIND+[illegible], IPARM, TIME+[illegible]., 1)
      GO TO (1 ,[illegible] ,[illegible] ,[illegible] ,[illegible] ,[illegible],7 ,[illegible] ,9[illegible],100,11[illegible],120,130,140,
     /   1[illegible],1[illegible],1[illegible]0), KIND
C
C**** CHECK [illegible] [illegible] [illegible] OF UNIT
    2 CALL [illegible] (IPARM)
      GO TO [illegible]
```

```
C*** * RELEASE OF ROUNDS OF AMMO AT UNIT WEAPONS
   20 CALL RELOAD (IPARM)
      GO TO 1
C
C*** * DEPARTURE OF TRUCK FROM UNIT
   30 CALL UNTDEP (IPARM)
      GO TO 1
C
C****  ARRIVAL OF UNIT TRUCK AT ATP
   40 CALL ATPARV (IPARM)
      GO TO 1
C
C***** ARRIVAL OF UNIT TRUCK AT ASP
   50 CALL ASPARV (IPARM)
      GO TO 1
C
C***** SERVICE OF UNIT TRUCK FROM QUEUE AT ATP
   60 CALL ATP (IPARM)
      GO TO 1
C
C***** SERVICE OF UNIT TRUCK FROM QUEUE AT ASP
   70 CALL ASP (IPARM)
      GO TO 1
C
C***** ARRIVAL OF TRUCK AT UNIT
   80 CALL UNTARV (IPARM)
      GO TO 1
C
C***** ARRIVAL OF TRUCK AT CSA   (FROM ATP OR ASP)
   90 CALL CSAARV (IPARM)
      GO TO 1
C
C***** ARRIVAL OF ATP TRUCK FROM CSA
  100 CALL ATPAR1 (IPARM)
      GO TO
```

```
C**** ARRIVAL OF ASP TRUCK AT ATP
  110 CALL ATPAR2 (IPARM)
      GO TO [illegible]
C
C**** ARRIVAL OF ASP TRUCK AT ASP    (FROM ATP)
  120 CALL ASPAR1 (IPARM)
      GO TO 5
C
C**** ARRIVAL OF HELICOPTER  AT UNIT
  130 CALL HELARV (IPARM)
      GO TO 5
C
C**** ARRIVAL OF HELICOPTER AT ASP
  140 CALL HASPA  (IPARM)
      GO TO 5
C
C**** REPORT
  150 CALL REPORT (IPARM)
      GO TO 5
C
C**** INTERACTIVE CONTROL
  160 CALL CONTRL (ITIME)
      GO TO 5
C
C**** SIMULATION END
  170 CALL ENDSIM(IPARM)
      CALL SYSTOP
      STOP
      END
```

b. SUBROUTINE: GETEVT

PURPOSE: Retrieves the next event chronologically from the event queue

COMMON BLOCKS: EVENTS

CALLS: NONE

IS CALLED BY: NEXTEV

CALLING PARAMETERS:

IEVT(5) - 5 parameters describing the event.
ITH - Integer minutes of battle.
ITS - Decimal minutes of battle minus ITH times 3600 and integerized.
IHIT - 0 if no events in queue, 1 if event in the queue.

LOCAL ARRAY:

JFORE (1024) - Equivalenced to first 1024 words of JEVDS of COMMON EVENTS and points to the previous event.

JBACK (1024) - Equivalenced to the second 1024 words of JEVDS of COMMON EVENTS and points to the follow-on event.

FUNCTIONS:

Retrieves the 5 parameters of the next event.

Retrieves the time of the next event occurring.

Updates the forward and backward pointers to reflect the next retrievable event.

```
      SUBROUTINE GETEVT(IEVT, ITH, ITS)
C
C      GETS NEXT EVENT
C      BOB DAVISON
C
      COMMON/EVENTS/JSTAT(6),JEVOS(1024,4), IEVS(5,1024)
      DIMENSION IEVT(5),JFORE(1024),JBACK(1024)
      EQUIVALENCE (JFORE(1),JEVOS(1,1)),(JBACK(1),JEVOS(1,2)),
     Z (JFIRST,JSTAT(1)),(JLAST,JSTAT(2)),(JEMPTY,JSTAT(3)),
     Z (NUMEVT,JSTAT(4)),(NEMPTY,JSTAT(5)),(MAXEVT,JSTAT(6))
C CHECK IF ANY EVENTS IN QUEUE ... IF NONE, RETURN
      DO 20 IN = 1,5
      IEVT(IN) = IEVS(IN,JFIRST)
   20 CONTINUE
      ITH = JEVOS (JFIRST,3)
      ITS = JEVOS (JFIRST,4)
      IF(NUMEVT.LE.0) RETURN
      NEXT=JFORE(JFIRST)
      JFORE(JFIRST)=JEMPTY
      JEMPTY=JFIRST
      IF(NEXT.LE.0) NEXT=1
      JBACK(NEXT)=0
      JFIRST=NEXT
      NEMPTY=NEMPTY+1
      NUMEVT=NUMEVT-1
      RETURN
      END
```

c. SUBROUTINE: NEXTEV

PURPOSE: Interface between ARM driver routine and the GETEVT routine to retrieve the next event.

COMMON BLOCKS: NONE

CALLS: GETEVT

IS CALLED BY: ARM Driver

CALLING PARAMETERS:

ITYPE - The event type.

IPARM (5) - The 5 parameters describing the event.

TIME - Present Simulation Time.

LOCAL ARRAYS: NONE

FUNCTIONS:

Calls GETEVT to retrieve event.

Computes a single time from the two times stored in the event logic.

```
      SUBROUTINE NEXTEV (ITYPE, IPARM, TIME)
C***** INTERFACE ROUTINE TO GET NEXT EVENT
C***** H. JONES    DEC 7[illegible]
      DIMENSION IPARM(5)
      CALL GETEVT (IPARM, ITH, ITS)
      TIME = ITH + ITS / 3600.
      ITYPE = IPARM(5)
      RETURN
      END
```

d. SUBROUTINE: PUTEVT

PURPOSE: Places an event record in the queue in chronological order and updates the queue pointer tables. If the placement is successful the flag (ICHECK) is set equal to 1.

COMMON BLOCKS: EVENTS

CALLS: NONE

IS CALLED BY: SCHED

CALLING PARAMETERS:

	IEVT(5)	- Contains the 5 parameters describing the event to be stored.
	ITH	- Contains the integer portion of the event time.
	ITS	- Contains the decimal portion of the event time multiplied by 3600.
	ICHECK	- 0 if no room on the file, 1 if there is room on the file.

LOCAL ARRAYS:

JFORE (1024) - Equivalenced to the first 1024 words of JEVDS and points to the previous event.

JBACK (1024) - Equivalenced to the second 1024 words of JEVDS and points to the subsequent event.

JTIME (1024, 2) - Equivalenced to the last 2048 words of JEVDS and keeps the time data associated with the event.

FUNCTIONS:

Checks to see if space is available.

Places event record in ARRAY IEVS in COMMON EVENTS.
Update pointers in event directory.

```
      SUBROUTINE PUTEVT(IEVT, ITH, ITS, ICHECK)
C
C PUTEVT PLACES AN EVENT RECORD IN THE QUEUE IN CHRONOLOGICAL
C ORDER AND UPDATES THE QUEUE DIRECTORY. ICHECK FLAG SET
C IF INSERT WAS UNSUCCESSFUL.
C       BOB DAVISON    1978
C
      COMMON/EVENTS/JSTAT(6),JEVDS(1024,4), IEVS(5,1024)
      DIMENSION IEVT(5),JFORE(1024),JBACK(1024),JTIME(1024,2)
      EQUIVALENCE (JFORE(1),JEVDS(1,1)),(JBACK(1),JEVDS(1,2)),
     Z (JTIME(1,1),JEVDS(1,3)),(JSTAT(1),JFIRST),(JSTAT(2),JLAST),
     Z (JSTAT(3),JEMPTY),(JSTAT(4),NUMEVT),(JSTAT(5),NEMPTY),
     4 (JSTAT(6),MAXEVT)
C CHECK IF SPACE AVAILABLE .. IF NONE, RETURN
      ICHECK = 1024 - NEMPTY
      IF(NEMPTY.LE.0) GOTO 400
      ICHECK=0
      LSAVE=JFORE(JEMPTY)
C PUT EVENT RECORD IEVT IN IEVS
      DO 20 IN = 1,5
      IEVS(IN,JEMPTY) = IEVT(IN)
   20 CONTINUE
C IF NO EVENTS IN QUEUE, PERFORM THE FOLLOWING
      IF(NUMEVT.GE.1) GOTO 200
      JFORE(JEMPTY)=0
      JBACK(JEMPTY)=0
      JFIRST=JEMPTY
      JLAST=JEMPTY
      GOTO 380
C IF ONE EVENT IN QUEUE, PERFORM THE FOLLOWING
  200 CONTINUE
      ITFH=JTIME(JFIRST,1)
      ITFS=JTIME(JFIRST,2)
      IF(NUMEVT.GT.1) GOTO 300
C IF LOWEST TIME EVENT, PERFORM THE FOLLOWING
      IF(ITH.GT.ITFH)GO TO 210
      IF(ITH.EQ.ITFH.AND.ITS.GE.ITFS)GO TO 210
      JFORE(JEMPTY)=JFIRST
      JBACK(JEMPTY)=0
      JBACK(JFIRST)=JEMPTY
      JLAST=JFIRST
      JFIRST=JEMPTY
      GOTO 380
C ELSE THIS TIME IS EQUAL TO OR LATER THAN THE LAST EVENT
  210 CONTINUE
      JFORE(JEMPTY)=0
      JBACK(JEMPTY)=JFIRST
      JFORE(JFIRST)=JEMPTY
      JLAST=JEMPTY
      GOTO 380
C IF TWO OR MORE EVENTS IN QUEUE, PERFORM THE FOLLOWING
  300 CONTINUE
C IF EVENT TIME IS LESS THAN FIRST EVENT, MAKE IEVT THE FIRST EVENT
```

```
      IF(ITH.GT.ITFH)GO TO 310
      IF(ITH.EQ.ITFH.AND.ITS.GE.ITFS)GO TO 310
      JFORE(JEMPTY)=JFIRST
      JBACK(JEMPTY)=0
      JBACK(JFIRST)=JEMPTY
      JFIRST=JEMPTY
      GOTO 380
C IF EVENT TIME IS GREATER THAN OR EQUAL TO LAST EVENT, MAKE IEVT LAST
310   CONTINUE
      ITLH=JTIME(JLAST,1)
      ITLS=JTIME(JLAST,2)
      IF(ITH.LT.ITHLH)GO TO 320
      IF(ITH.EQ.ITLH.AND.ITS.LT.ITLS)GO TO 320
      JFORE(JEMPTY)=0
      JBACK(JEMPTY)=JLAST
      JFORE(JLAST)=JEMPTY
      JLAST=JEMPTY
      GOTO 380
C EVENT TIME IS BETWEEN JTIME(JFIRST) AND JTIME(JLAST)
 320  CONTINUE
      NUM=NUMEVT-1
C IF EVENT TIME CLOSER TO FIRST, START SEARCH AT FIRST EVENT
      IF((ITH-ITFH)-(ITLH-ITH))326,325,350
325   IF((ITS-ITFS)-(ITLS-ITS))326,326,350
326   IND1=JFIRST
      IT1H=ITFH
      IT1S=ITFS
      IND2=JFORE(JFIRST)
      IT2H=JTIME(IND2,1)
      IT2S=JTIME(IND2,2)
      DO 330 I=1,NUM
      IF(ITH.GT.IT2H)GO TO 327
      IF(ITH.EQ.IT2H.AND.ITS.GE.IT2S)GO TO 327
      GO TO 340
327   IND1=IND2
      IT1H=IT2H
      IT1S=IT2S
      IND2=JFORE(IND2)
      IT2H=JTIME(IND2,1)
      IT2S=JTIME(IND2,2)
 330  CONTINUE
      ICHECK=2
      GO TO 400
 340  JFORE(IND1)=JEMPTY
      JBACK(JEMPTY)=IND1
      JFORE(JEMPTY)=IND2
      JBACK(IND2)=JEMPTY
      GOTO 380
C EVENT TIME CLOSER TO LAST, START SEARCH AT LAST EVENT
 350  IND1=JLAST
      IT1H=ITLH
      IT1S=ITLS
      IND2=JBACK(JLAST)
      IT2H=JTIME(IND2,1)
      IT2S=JTIME(IND2,2)
      DO 360 I=1,NUM
      IF(ITH.LT.IT2H)GO TO 355
      IF(ITH.EQ.IT2H.AND.ITS.LT.IT2S)GO TO 355
      GO TO 370
355   IND1=IND2
      IT1H=IT2H
      IT1S=IT2S
      IND2=JBACK(IND2)
      IT2H=JTIME(IND2,1)
      IT2S=JTIME(IND2,2)
360   CONTINUE
      ICHECK=2
      GOTO 400
370   JFORE(IND2)=JEMPTY
      JBACK(JEMPTY)=IND2
      JFORE(JEMPTY)=IND1
      JBACK(IND1)=JEMPTY
C PERFORM THE FOLLOWING FOR ALL EVENTS
 380  CONTINUE
      JTIME(JEMPTY,1)=ITH
      JTIME(JEMPTY,2)=ITS
      NUMEVT=NUMEVT+1
      NEMPTY=NEMPTY-1
      JEMPTY=LSAVE
 400  RETURN
      END
```

e. SUBROUTINE: ASP

PURPOSE: Services the unit trucks from the queues and maintains Ammunition Supply Point (ASP) bookkeeping.

COMMON BLOCKS: LOG

CALLS:

GETQUE
INTRDK
OPERA
SCHED

IS CALLED BY: ARM Driver

CALLING PARAMETERS

```
IPARM(5) - (1) -- 1 if routine queue, 2 if GSRS queue
         - (2) -- ASP Number
```

LOCAL ARRAYS: None

FUNCTIONS:

Retrieve truck from queues; If no truck, have false event, schedule another and return.

Determine ammunition mix, load time.

Record ammunition used by incrementing IASPAM and decrementing IASP.

Compute travel time.

Check for truck failure and/or interdiction.

Schedule truck to arrive back at the unit.

Schedule the next ASP event for this queue.

```
      SUBROUTINE ASP (IPARM)
C**** EVENT ASP -- SERVICE OF TRUCK FROM QUEUE AT ASP.
C
C**** J. FOX      JAN 79
C
C**** IPARM(1) --      1 = ROUTINE QUEUE,   2 = CSRS QUEUE
C**** IPARM(2) --      ASP NUMBER
C
C**** SCHEDULES   --   UNITARV, ARRIVAL OF TRUCK AT UNIT
C                      ASP, SERVICE OF UNIT TRUCK FROM QUEUE AT ASP
C
C**** (1) TAKES TRUCK OUT OF ITS QUEUE
C**** (2) CALCULATES LOAD TIME AS FUNCTION OF LOAD MIX
C****      NUMBER AND NUMBER OF SERVERS ACTIVE FOR THIS QUEUE.
C
C**** CHECKS  --  DELAY DUE TO MTBF AND INTERDICTION.
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     7  IRSTME(20,3), IATPSD(5), IDAY, TIME,
     6  ICSA(25), LPEAR(5), IASPAM(4,20), LUOUT, ICIST, TCILNG, LOOK(17)
      DIMENSION IPARM(5)
C     LOCAL VARIABLE DEFINITION
C     NUMQ - QUEUE NUMBER TO BE SERVICED
C     NTRUCK - TRUCK TO BE SERVED
C     NUMR G - NUMBER OF SERVERS IN THE ROUTINE QUEUE
C     NUNIT - NUMBER OF UNIT OWNING TRUCK
C     JCODE - DO LOOP TOP FROM LPEAR EQUAL TO NUMBER OF AMMO CODES
C     MIX - AMMO MIX INDEX TO ACCESS IMIX
C     TLOAD - TIME FOR A SERVER TO LOAD ONE TRUCK
C     ITRTYP - TYPE OF TRUCK TO BE SERVED
C     NUNIT - UNIT NUMBER OWNING THE TRUCK
C     DIST - DISTANCE BETWEEN ASP AND UNIT
C     TRTM - ASP TO UNIT TRAVEL TIME
C     TFAIL - TIME LOST DUE TO FAILURE
C     TINTR - TIME LOST DUE TO INTERDICTION
C     NSERV - TOTAL NUMBER OF SERVERS AT NUMQUE
C     TOTTIM -TIME OF SCHEDULED EVENT
```

```
C     GET TRUCK FROM THE QUEUE
   10 NUMD=IQ(7+IPARM(1),IPARM(2))
      CALL GETQUE(NTRUCK,NUMD)
C**** IF REAL EVENT, NTRUCK.GT.0, GO TO 55
      IF(NTRUCK.GT.0) GO TO 55
C**** SCHEDULE ANOTHER FALSE EVENT
      TOTIM=TIME+5.
      CALL SCHED(7,IPARM,TOTIM)
      RETURN
   55 CONTINUE
      MIX = ITRUCK(NTRUCK,5)
      IF (MIX .EQ.0)ITRUCK(NTRUCK,7)=7
      IF (MIX .EQ. 0)   GO TO 10
      TLOAD = IMIX(MIX,23)
      IF (IDAY.EQ.2) TLOAD = 1.54*TLOAD
      JLOOP = LPPAR(1)
      DO 60 I = 1,JLOOP
      IASPAM(IPARM(2),I) = IASPAM(IPARM(2),I) + IMIX(MIX,I)
      IASP(IPARM(2),I+13) = IASP(IPARM(2),I+13) - IMIX(MIX,I)

   60 CONTINUE
C       FIND TYPE OF TRUCK AND COMPUTE TRAVEL TIME
        ITKTYP = ITRUCK(NTRUCK,1)
        NUNIT = ITRUCK(NTRUCK,4)
        DIST = IUNIT(NUNIT,5)
        TRTIM = 60. * DIST / ITYPE(ITKTYP,IDAY+1)
        ITRUCK(NTRUCK,7) = 4
        CALL UPDATA(NTRUCK,TRTIM,TFAIL)
        CALL TNTRUK(NTRUCK,FIND)
C**** IF SO WE DONT NEED A FALSE EVENT SINCE EACH ARRIVAL DOES OWN
        IF(IPARM(1) .EQ. 2)GO TO 62
C       SCHEDULE NEXT ASP EVENT
        FSPRV = IASP(IPARM(2),7)
        TOTIM = TIME + TLOAD / FSPRV
        CALL SCHED(7,IPARM,TOTIM)
C       DECREMENT NUMBER OF TRUCKS IN QUEUE
   62 IASP(IPARM(2),IPARM(1)+11) = IASP(IPARM(2),IPARM(1)+11) - 1
```

```
C     SCHEDULE UNITARY
      IASP=IPARM(2)
      IPARM(1) = NUNIT
      IPARM(2) = NTRUCK
      TOTTIM = TIME + ILOAD + IMIND + IFAIL + IRTM
C     IF NO INTERDICTION, BYPASS.
      IF(IMIND .LE. 0)GO TO 70
C     CHANGE AMMO AND LOAD TIME
      JLOOP = LPPAR(1)
      DO 65 I = 1,JLOOP
      IASPAM(NASP,I) = IASPAM(NASP,I) + IMIX(MIX,I)
      IASP(NASP,I + 13) = IASP(NASP,I+13) - IMIX(MIX,I)
   65 CONTINUE
      TOTTIM=TOTTIM + ILOAD
   70 CONTINUE
      CALL SCHED(5,IPARM,TOTTIM)
      ITRUCK(IPARM(2),6) = 100
      RETURN
      END
```

f. SUBROUTINE: ASPAR 1

PURPOSE: Processes an Ammunition Transfer Point (ATP) truck arriving at the Ammunition Resupply Point (ASP).

COMMON BLOCKS: LOG

CALLS: INTRDK
OPERA
SCHED

IS CALLED BY: ARM Driver.

```
CALLING PARAMETERS:  IPARM(5) - (1) -- ATP Number
                                (2) -- TRUCK Number
                                (3) -- ASP Number
```

LOCAL ARRAYS: None

FUNCTIONS:

Determine the type ammunition on the truck and decrement IASP and increment IASPAM.

Check for truck failure and interdiction.

Schedule arrival back at the ATP as appropriate.

```
      SUBROUTINE ASPAR1  (IPARM)
C**** EVENT ASPAR1 -- ARRIVAL OF ASP TRUCK AT ASP   (FROM ATP)
C
C**** J. FOX   JAN 79
C
C**** IPARM(1) -- ATP NUMBER
C**** IPARM(2) -- TRUCK NUMBER
C**** IPARM(3) -- ASP NUMBER
C
C**** SCHEDULES  --  ATPAR2, ARRIVAL OF ASP TRUCK AT ATP
C
C**** CHECKS     -- DELAY DUE TO MTBF AND INTERDICTION
C
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSTME (20,3), IATPSD(5), IDAY, TIME,
     $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILING, LOOK(17)
      DIMENSION IPARM(5)
C**** LOCAL VARIABLES DEFINITION
C     MIX - AMMO ON TRUCK INDEX TO IMIX
C     IND - INDEX FOR AMMO INVENTORY CONTROL IN IASP
C     TRTM - TRAVEL TIME TO ATP
C**** JLOOP - DO LOOP TOP FROM LPPAR EQUAL TO NUMB OF AMMO CD AT ATP
C**** TKSP - TRUCK SPEED
C     ITKTYP - TRUCK TYPE
C     IFAIL - TIME LOST DUE TO TRUCK FAILURE
C     TMIND - TIME LOST DUE TO INTERDICTION
C**** TMLD - TIME TO LOAD AMMO AT ASP
C     TOTTIM - TIME OF ARRIVAL AT ATP
C     FIND AMMO MIX INDEX ON THE TRUCK - MIX
      MIX = ITRUCK (IPARM(2),5)
C     DECREMENT ASP AMMO
      JLOOP = LPPAR(2)
      DO 5 I = 1,JLOOP
      IND = I+13
      IASP(IPARM(3), IND) = IASP(IPARM(3),IND) - IMIX(MIX,I)
C     INCREMENT AMMO USED FROM ASP
      IASPAM (IPARM(3),I) = IASPAM(IPARM(3),I) + IMIX(MIX,I)
    5 CONTINUE
C     SCHEDULE ATPAR2, COMPUTE NECESSARY PARAMETERS
      ITKTYP = ITRUCK (IPARM(2),1)
      TKSP = ITYPE(ITKTYP,IDAY+3)
      TRTM = 60 * IASP(IPARM(3),2) /TKSP
C     COMPUTE TIME LOST DUE TO TRUCK FAILURE
      CALL OPERA(IPARM(2),TRTM,TFAIL)
C     COMPUTE INTERDICTION TIME LOST
```

```
      CALL INTRDK(IPARM(2),TMIND)
C     CONSIDER LOAD TIME AT ASP WHICH MIGHT BE ZERO
      TMLD = IMIX(MIX,23)
C**** IF NO INTERDICTION, BYPASS
      IF (TMIND .LE. 0)GO TO 15
C**** DECREMENT AMMO AGAIN SINCE LOST A TRUCK LOAD
C**** ADD ANOTHER LOAD TIME
      JLOOP = LPPAR(2)
      DO 10 I = 1,JLOOP
      IND = I + 13
      IASP(IPARM(3),IND) = IASP(IPARM(3),IND) - IMIX(MIX,I)
      IASPAM(IPARM(3),I) = IASPAM(IPARM(3),I) + IMIX (MIX,I)
   10 CONTINUE
      TMIND = TMIND + TMLD
   15 CONTINUE
C     SCHEDULE ARRIVAL AT ATP AT TIME TOTTIM
      TOTTIM = TIME +TRIM + TMIND + TFAIL + TMLD
      ITRUCK(IPARM(2),6) = 100
      CALL SCHED (11,IPARM,TOTTIM)
C
      RETURN
      END
```

g. SUBROUTINE: ASPARV

PURPOSE: To process the arrival of a unit truck at the Ammunition Resupply Point (ASP)

COMMON BLOCKS: LOG

CALLS: PUTQUE
SCHED

IS CALLED BY: ARM Driver

CALLING PARAMETERS: IPARM (5) - (1) -- Unit Number
(2) -- Truck Number
(3) -- ASP Number

LOCAL ARRAYS: None

FUNCTIONS:

Determines ammunition mix on truck.

Determines if truck should be in GSRS or routine queue.

Places truck in proper queue.

Schedules ASP event if this is the first truck in the routine queue or is a GSRS truck.

```
      SUBROUTINE ASPARV (IPARM)
C**** EVENT ASPARV -- ARRIVAL OF UNIT TRUCK AT ASP
C
C**** J. FOX      JAN 79
C
C**** IPARM(1) -- UNIT NUMBER
C**** IPARM(2) -- TRUCK NUMBER
C**** IPARM(3) -- ASP NUMBER
C
C*** - THIS EVENT PUTS TRUCK IN PROPER ASP QUEUE.
C
C**** SCHEDULES  -- ASP SERVICE OF UNIT TRUCK FROM QUEUE AT ASP
C                     (IF ASP SERVICE FOR THIS QUEUE IS IDLE)
C
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(569,7), ITYPE(6,6), IMIX(40,23), INTER(3),
     Z  IXSIME(22,3), IATPSO(5), IDAY, TIME,
     I  IGSA(23), IPEAK(5), TASPAN(4,23), LUOUT, TCIST, TCILNG, LOOK(17)
      DIMENSION IPARM(5)
C     LOCAL VARIABLES
C     MIX - THE INDEX OF THE AMMO TYPE FROM IMIX
C      INDEX - QUEUE FOR TRUCK
C     IND - INDEX TO COUNT TRUCKS QUEUE
C     DETERMINE AMMO MIX INDEX.
      MIX = ITRUCK(IPARM(2),5)
C     ASSUME NO GSS IN MIX
      INDEX = IQ(3,IPARM(3))
      IND = 12
      IFLAG=0
C     IF GSS COUNT IN INDEX,IND
      IF(IMIX(MIX,15) .EQ. 0) GO TO 6
      INDEX=IQ(1,IPARM(3))
      IND = 13
      IFLAG=1
```

```
C     PUT TRUCK INTO PROPER QUEUE
    5 CALL FUTQUE(IPARM(2),INDEX)
C     INCREMENT NUMBER OF TRUCKS IN QUEUE
      IASP(IPARM(3),IND) = IASP(IPARM(3),IND) +1
C     CHANGE THE STATUS OF THE TRUCK
      ITRUCK(IPARM(2),3) = 3
C**** IF QUEUE IS UNUSED SCHEDULE ASP NOW ELSE GO TO 10
      IF(IASP(IPARM(3),IFLAG).GT.0) GO TO 10
C**** IF GSPS DO NOT SET FLAG,SINCE EACH TRUCK HAS OWN SERVER
      IF(IMIX(MIX,10) .GT. 0)GO TO 4
      IASP(IPARM(3),IFLAG)=1
C     SCHEDULE ASP NOW
    4 IPARM(1) = 1
      IF(IMIX(MIX,10) .GT. 0)IPARM(1) = 2
      IPARM(2) = IPARM(3)
      CALL SCHED(7,IPARM,TIME)
   10 CONTINUE
      RETURN
      END
```

h. SUBROUTINE: ATP

PURPOSE: Services a unit truck waiting in the Ammunition Transfer Point (ATP) queue and updates the bookeeping files as to ATP status.

COMMON BLOCKS: LOG

CALLS: FINTK
GETQUE
INTRDK
IQ
LDPWDR
OPERA
PUTQUE
SCHED

IS CALLED BY: ARM Driver

CALLING PARAMETERS: IPARM (5) - (1) -- 1 if artillery queue, 2 if maneuver queue
(2) -- ATP Number

LOCAL ARRAYS: IIPARM(5) - Used to schedule other events.

FUNCTIONS:

Determine if servers require shifting from one queue to another.

Obtain truck from queue; if no truck schedule another look (false event) 5 minutes later and return.

Determine the type of ammunition needed.

Unload from ASP-ATP truck if available, else unload from CSA-ATP truck

If empty ASP-ATP or CSA-ATP truck send for refill.

If artillery ammunition (4 or 5), load powder cylinders (type 3) also, schedule truck back to unit.

Check failure and interdiction for all trucks leaving the ATP.

```
      SUBROUTINE ATP (IPARM)
C**** EVENT ATP -- SERVICE OF TRUCK FROM QUEUE AT ATP.
C
C**** J. FOX     JAN 79
C
C**** IPARM(1) --   1 = ARTILLERY QUEUE,      2 = MANEUVER QUEUE
C**** IPARM(2) --   ATP NUMBER
C**** SCHEDULES  -- CSAARV, ARRIVAL OF CSA-ATP TRUCK AT CSA
C                   UNTARV, ARRIVAL OF TRUCK AT UNIT
C                   ASPAR1, ARRIVAL OF ASP-ATP TRUCK AT ASP
C                   ATP, SERVICE OF TRUCK FROM QUEUE AT ATP
C
C**** (1) TAKES TRUCK OUT OF ITS QUEUE
C**** (2) CALCULATES LOAD TIME AS FUNCTION OF LOAD MIX
C****     NUMBER AND NUMBER OF SERVERS ACTIVE FOR THIS QUEUE.
C
C**** CHECKS  --  DELAY IN ARRIVAL DUE TO MTBF AND INTERDICTION.
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSTME(20,3), IATPSD(5), IDAY, TIME,
     $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
      DIMENSION IPARM(5)
C     LOCAL VARIABLE DEFINITION
C     NUMQ - QUEUE TO BE SERVED
C     NUMTK - TRUCK TO BE SERVED
C     NUMART - NUMBER OF ARTY QUEUE SERVERS
C     NUMMAN - NUMBER OF MANEUVER AMMO SERVERS
C     NINC - NUMBER OF FORKLIFT FROM INACTIVE TO ACTIVE
C     MIX - INDEX OF AMMO MIX ON TRUCK
C     NRNDSN - NUMBER OF ROUNDS NEEDED BY THE TRUCK NUMTK
C     IRNTYP - TYPE OF ROUNDS NEEDED BY NUMTK
C     IPROG - EVENT TYPE TO BE SCHEDULED
C     JLOOP - DO LOOP TOP FROM LPPAR = NUM OF AMMO CD AT ATP
C     NASP - ASP NUMBER THAT THIS ATP BELONGS TO
C     NFKLK - NUMBER OF FORK LIFTS SERVING QUEUE
C     NRND - NUMBER OF POWDER CHARGES NEEDED
C     NASPQ -- NUMBER OF THE ASP:-:ATP TRUCK QUEUE
C     NASTK - NUMBER OF ASP ATP TRUCK
C     NRONTK - NUMBER OF ROUNDS ON SUPPLY TRUCK
C     MIXX - MIX INDEX OF AMMO ON SUPPLY TRUCK
C     DIST - ROAD DIST TO BE TRAVELED
C     ITKTYP = TRUCK TYPE
C     TRIM - ROAD TRAVEL TIME
C     TFAIL - TIME DELAY DUE TO FAILURE
C     TMIND - TIME DELAY DUE TO INTERDICTION
C     TOTTIM - TIME TO SCHEDULE ATP OR ASP ARRIVAL
C     TPAR - TIME REQUIRED TO SHIFT A PARTIAL LOAD
C     FRNA - FLOATING POINT NUMBER FOR ROUNDS AVAILABLE FOR THE PARTIAL
C     FRNN - REAL VARIABLE FOR NUMBER OF ROUNDS NEEDED
C     NCSAQ - CSA ATP QUEUE NUMBER
C     TLOAD - LOAD TIME
C
```

```
      DIMENSION IIPRAM(5)
      DO 1 I =1,5
      IIPRAM(I) = 0
    1 CONTINUE
      NUMART  = IATP(IPARM(2),9)
      NUMMAN = IATP(IPARM(2),10)
      NTOTWK=IATP(IPARM(2),10) + IATP(IPARM(2),9)
      NINC = 0
C     QUEUE THRESHOLD LOGIC
C    IF NEITHER QUEUE IS LONGER THAN THRESHOLD 1, NO CHANGE(90)
      IF(IATP(IPARM(2),14) .LT. IATPSD(2) .AND. IATP(IPARM(2),15)
     Z  .LT. IATPSD(4))GO TO 90
C     IF NOT ABOVE THRESHOLD 2 AND OTHER GT 0 NO CHANGE(90)
      IF(IATP(IPARM(2),14) .LT. IATPSD(3) .AND. IATP(IPARM(2),15)
     Z  .GT. 0)GO TO 2
C     NEED TO CHANGE(5)
      GO TO 5
    2 IF(IATP(IPARM(2),15) .LT. IATPSD(5) .AND. IATP(IPARM(2),14)
     Z  .GT. 0)GO TO 90
C     MAKE ADJUSTMENT.IF ARTY QUEUE EMPTY MOVE SERVERS TO MANEUVER
    5 IF(IATP(IPARM(2),14) .GT. 0)GO TO 10
      NUMMAN = NUMMAN +NUMART
      WRITE(LUOUT,6) NUMART,NUMMAN
    6 FORMAT(I6," ARTY SERVERS HAVE MOVED TO HELP ",I4," MANVR SERVERS")
      GO TO 30
   10 IF(IATP(IPARM(2),15) .GT. 0)GO TO 20
C     MANEUVER  QUEUE EMPTY SHIFT SERVERS
      NUMART = NUMART + NUMMAN
      WRITE(LUOUT,15) NUMMAN,NUMART
   15 FORMAT(I6," MNVR SERVER HAVE MOVED TO HELP ",I4," ARTY SERVERS")
C     IF ARTY GT THRESHOLD 2 WAKE UP SERVERS
   20 IF(IATP(IPARM(2),14) .LT. IATPSD(3))GO TO 30
      NINC=IATP(IPARM(2),9)*(IATPSD(1)-NTOTWK)/(1+NTOTWK)+1
      NUMART=NUMART + NINC
      WRITE(LUOUT,25) NUMART
   25 FORMAT(" DUE TO THRESHOLD 2 ON ARTY,",I4," SERVERS ARE NOW AWAKE")
      GO TO 90
   30 IF(IATP(IPARM(2),15) .LT. IATPSD(5))GO TO 90
      KINC=IATP(IPARM(2),10)*(IATPSD(1)-NTOTWK)/(1 + NTOTWK) + 1
      NUMMAN = NUMMAN + KINC
      WRITE(LUOUT,35) NUMMAN
   35 FORMAT(" DUE TO THRESHOLD 2 ON MNVR,",I4," SERVERS ARE NOW AWAKE")
      IF(NINC .GT. 0)KINC = IATPSD(1) - (NUMMAN + NUMART)
      NUMMAN = KINC + NUMMAN
C     DETERMINE QUEUE NUMBER NUMQ
   90 NUMQ=IQ(IPARM(1)+3,IPARM(2))
C     REMOVE TRUCK FROM QUEUE
      CALL GETQUE(NUMTK,NUMQ)
C**** CHECK FOR FALSE EVENT, NUMTK=0
      IF(NUMTK.GT.0) GO TO 95
C**** HAVE FLASE EVENT SCHEDULE NEXT FALSE EVENT
      TOTIM=TIME+10.
      CALL SCHED(6,IPARM,TOTIM)
      RETURN
   95 CONTINUE
C     FIND AMMO MIX INDEX OF TRUCK  MIX
      MIX = ITRUCK(NUMTK,5)
C     FIND AMMO TYPE WANTED.  ASSUME ONLY ONE TYPE
      JLOOP = LPPAR(2)
      DO 100 I = 1,JLOOP
      IF(IMIX(MIX,I) .GT. 0)GO TO 120
  100 CONTINUE
C     IF EXIT HERE NO AMMO IN THIS MIX.
      WRITE(LUOUT,105)MIX
  105 FORMAT(" MIX  ",I5,"   CONTAINS NO TYPES OF AMMO - ATP ")
      RETURN
C     RECORD NUMBER OF ROUNDS NEEDED - NRNDSN AND TYPE OF ROUNDS
  120 NRNDSN = IMIX(MIX,I)
      IRNTYP = I
C    NOW TO LOCATE TRUCK CONTAINING PROPER TYPE OF AMMO
C     FIRST CHECK ASP TRUCKS. PASS AMMO AND QUEUE TO CHECK.
      NASPQ = IQ(3,IPARM(2))
  130 CALL FINTK(NASPQ,IRNTYP,NASTK)
C    IF NO TRUCK, GO TO 140
      IF(NASTK .EQ. 0)GO TO 140
C     FIND THE NUMBER OF ROUNDS ON NASTK. IF SUFFICIENT, DECREMENT
C     AMMO, SCHEDULE UNTARV, PUT TRUCK BACK IN ASP Q.
C     IF INSUFFICIENT EMPTY ASP TRUCK, SENT TO ASP, DECREMENT
C     THE NUMBER OF ROUNDS REQUIRED, FIND ANOTHER TRUCK WITH
C     THE PROPER AMMO
C     UPDATE PER CENT POUNDS ON THE TRUCK
      MIXX = ITRUCK(NASTK,5)
      NRONTK = (IMIX(MIXX,IRNTYP) * ITRUCK(NASTK,6) + 99) / 100
      WRITE(LUOUT,300)MIX,MIXX,IRNTYP,NRONTK,NRNDSN,NUMTK,NASTK,NASPQ
  300 FORMAT("   IATP ",8I6)
C     IF INSUFFICIENT ROUNDS GO TO 150
      IF(NRNDSN .GT. NRONTK)GO TO 150
C     SUFFICIENT AMMO ON TRUCK.  DECREMENT AMMO ON TRUCK.
C     IF ARTY AMMO GO LOAD POWDER TRUCK
      NRND = IMIX(MIX,IRNTYP)
      IF(IRNTYP .GT. LPPAR(3))CALL LDPWDR(NRND,IPARM)
      ITRUCK(NASTK,6) = 100 * (NRONTK - NRNDSN) / IMIX(MIXX,IRNTYP)
C     PUT TRUCK BACK IN QUEUE
C**** IF TRUCK IS EXACTLY EMPTY DO NOT PUT INTO QUEUE
      IF(ITRUCK(NASTK,6) .EQ. 0)GO TO 150
      CALL PUTQUE(NASTK,NASPQ)
C     GO TO SCHEDULE UNTARV
      GO TO 200
**** INSUFFICIENT AMMO OR EXACTLY ENOUGH AMMO ON S AND P
C     TIME TO SHIFT PARTIAL LOAD
  150 FRNN = NRNDSN
      FRNA = NRONTK
      TPAR = IMIX(MIX,22) * FRNA / FRNN
      IF (IDAY .EQ. 0) TPAR = 1.54*TPAR
      NRNDSN = NRNDSN - NRONTK
      ITRUCK(NASTK,6) = 0
C     SCHEDULE ASPAR1 FOR NASTK
C     DETERMINE DIST TO BE TRAVELED
      DIST = IATP(IPARM(2),2)
      IF(NASPQ .EQ. IQ(2,IPARM(2)))DIST = IATP(IPARM(2),1)
      ITKTYP = ITRUCK(NASTK,1)
      TRTM = 60 * DIST / ITYPE(ITKTYP,IDAY+3)
      ITRUCK(NASTK,3) = 4
C     COMPUTE DELAY DUE TO FAILURE - TFAIL
      CALL OPERA(NASTK,TRTM,TFAIL)
C     INTERDICTION DELAY - TMIND
      CALL INTRDK(NASTK,TMIND)
      TOTTIM = TRTM + TIME + TFAIL + TMIND + TPAR
      IIPRAM(1) = IPARM(2)
      IIPRAM(2) = NASTK
      IIPRAM(3) = IATP(IPARM(2),6)
C     ASSUME ASP-ATP TRUCK
      IPROG=12
C     IF NASPQ THE CSA-ASP QUEUE THEN CHANGE CALL
      IF(NASPQ .NE. IQ(2,IPARM(2)))GO TO 143
      IPROG = 9
      IIPRAM(3) = 1
  143 CALL SCHED(IPROG,IIPRAM,TOTTIM)
C**** IF EXACTLY ENOUGH ROUNDS ON TRUCK,SEND TRUCK BACK TO UNIT
      IF(NRNDSN.EQ.0) GO TO 200
C     GO GET ANOTHER ASP-ATP TRUCK TO COMPLETE THE LOAD
      GO TO 130
C     NA ASP-ATP TRUCK SO TRY CAS ATP TRUCK
C**** IF HAVE LOOKED AT CSA QUEUE, THERE IS NO AMMO GO TO 142, TRUCK LOS
  140 IF(NASPQ.EQ.IQ(2,IPARM(2))) GO TO 142
      NASPQ=IQ(2,IPARM(2))
      GO TO 130
C**** WRITE FLAG
  142 WRITE(2,142) IPARM(2),IRNTYP,TIME
  141 FORMAT(" ATP NUMB ",I2," IS OUT OF AMMO ",I4," AT TIME ",F8.2)
      RETURN
C     HAVE SUFFICIENT AMMO, SCHEDULE UNTARV AND NEXT ATP DECREMENT
  200 IATP(IPARM(2),IPARM(1)+13) = IATP(IPARM(2),IPARM(1)+13) - 1
C     DECREMENT AMMO
      IATP(IPARM(2),IRNTYP*3+13) = IATP(IPARM(2),IRNTYP*3+13)
     Z   - IMIX(MIX,IRNTYP)
      IATP(IPARM(2),IRNTYP*3+14)=IATP(IPARM(2),IRNTYP*3+14) -
     Z    IMIX(MIX,IRNTYP)
      NFKLF = NUMART
      IF(IPARM(1) .EQ. 2)NFKLF = NUMMAN
      TLOAD=IMIX(MIX,22)/NFKLF
      IF (IDAY.EQ.0) TLOAD = 1.54*TLOAD
      TOTTIM = TIME + TLOAD
      IF(IATP(IPARM(2),IPARM(1)+13) .GE. 1)CALL SCHED(6,IPARM,TOTTIM)
C**** IF QUEUE IS EMPTY SCHEDULE FALSE EVENT
      TOTIM=TOTTIM+5.
      IF(IATP(IPARM(2),IPARM(1)+13).EQ.0) CALL SCHED(6,IPARM,TOTIM)
C     SCHEDULE UNTARV
      ITRUCK(NUMTK,3) = 4
      CALL INTRDK(NUMTK,TMIND)
C     IF NO INTERDICTION, BYPASS
      IF(TMIND .LE. 0)GO TO 160
C     DECREMENT AMMO
      NASP = IATP(IPARM(2),6)
      IASPAM(NASP,IRNTYP) = IASPAM(NASP,IRNTYP) + IMIX(MIX,IRNTYP)
      IASP(NASP,IRNTYP+13) = IASP(NASP,IRNTYP+13) - IMIX(MIX,IRNTYP)
      TMIND = TMIND + IMIX(MIX,23)
  160 CONTINUE
      IPARM(1) = ITRUCK(NUMTK,4)
      IPARM(2) = NUMTK
      DIST = IUNIT(IPARM(1),4)
      ITKTYP = ITRUCK(NUMTK,1)
      TRTM = 60 * DIST / ITYPE(ITKTYP,IDAY+1)
      CALL OPERA(NUMTK,TRTM,TFAIL)
      TLOAD = IMIX(MIX,22)
      IF (IDAY .EQ. 0) TLOAD = 1.54*TLOAD
      TOTTIM = TIME + TRTM + TFAIL + TMIND + TLOAD
      CALL SCHED(8,IPARM,TOTTIM)
      ITRUCK(IPARM(2),6) = 100
      RETURN
      END
```

i. SUBROUTINE: ATPARV

PURPOSE: Processes the arrival of the unit truck at the Ammunition Transfer Point (ATP).

COMMON BLOCKS: LOG

CALLS: PUTQUE
       SCHED

IS CALLED BY: ARM Driver

```
CALLING PARAMETERS:  IPARM (5) - (1) -- Unit Number
                                 (2) -- Truck Number
                                 (3) -- ATP Number
```

LOCAL ARRAYS: None.

FUNCTIONS:

Determine ammunition needed by the unit truck.

If ammunition is not available at the ATP send truck to the ASP(ASPARV).

If ammunition is available at the ATP place truck in the ATP queue.

If first truck in the ATP queue, schedule an ATP event.

```
      SUBROUTINE ATPARV (IPARM)
C**** EVENT ATPARV -- ARRIVAL OF UNIT TRUCK AT ATP
C
C**** J. FOX     JAN 79
C
C**** IPARM(1) -- UNIT NUMBER
C**** IPARM(2) -- TRUCK NUMBER
C**** IPARM(3) -- ATP NUMBER
C
C**** SCHEDULES   -- ASPARV, ARRIVAL OF UNIT TRUCK AT ASP
C                    (IF AMMO IS NOT CURRENTLY ON HAND FOR ALL
C                    TRUCKS IN QUEUE)
C                 --ATP,SERVICE OF UNIT TRUCK FROM QUEUE AT ATP
C                    (IF ATP SERVICE WAS IDLE FOR THIS QUEUE)
C
C**** DATA REQUIRED    --  AMMO REQUIRED BY TRUCKS IN QUEUE.
C
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSTME(20,3), IATPSD(5), IDAY, TIME,
     $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
      DIMENSION IPARM(5)
C     LOCAL VARIABLES DEFINED
C     JLOOP - TOP OF DO LOOP FROM COMMON LPPAR
C     NUMQ - ATP QUEUE FOR ARTY OR ROUTINE SERVICE
C     MIX - INDEX OF AMMO MIX USED TOACCESS IMIX.
C     NEEDTK - NUMBER OF ROUNDS NEEDED TYPE I BY UNIT  TRUCK.
C     INDEX - INDEX COMPUTED FOR AMMO TYPE I TO ACCESS
C          ONHAND AND WANTED BY TRUCK IN QUEUE.
C     JONHAND - AMOUNT OF AMMO TYPE I PRESENTLY ON HAND AT ATP
C     NEEDOT - AMOUNT OF AMMO I NEEDED BY OTHER TRUCKS IN QUEUE.
C     MANART - FLAG SET TO 2 IF MANEUVER AMMO, 1 IF ARTY AMMO
C     DIST - DIST FROM ASP TO ATP.
C     RATE - TRUCK MOVEMENT SPEED
C     ITKIYP - TRUCK TYPE FROM ITRUCK.
C     TRTM - UNOPPOSED TRAVEL TIME.
C     TFAIL - TRAVEL TIME INCREMENT DUE TO MECHANICAL FAILURE
C     TMIND - TRAVEL TIME INCREMENT DUE TO INTERDICTION
C     TOLRDS - TOTAL RDS NEEDED BY ALL ARTY TRKS
C     TOTTIM - TIME OF TRUCK ARRIVAL AT ASP
C     DETERMINE AMMO MIX WANTED BY THE TRUCK.
      MIX = ITRUCK(IPARM(2),5)
      IF(MIX.GT.0) GO TO 1
      WRITE(2,2) IPARM(2)
    2 FORMAT(" ATPARV -- ZERO MIX ON TRUCK ", I4)
      RETURN
    1 CONTINUE
C     SINCE AT ATP CHECK FOR ATP AMMO 1 THRU LPPAR(2)
      JLOOP = LPPAR(2)
      DO 5 I = 1,JLOOP
C     IF NO AMMO I IN MIX GO TO 5.
      IF(IMIX,I) .EQ. 0)GO TO 5
```

```
C       AMMO I IS NEEDED  HOW MUCH
        NEEDTK = IMIX(MIX,I)
C       ASSUME MANEUVER AMMO.
        MANART = 2
C       IF ARTY RESET MANART
        IF(I .GT. LPPAR(3))MANART = 1
C       HOW MANY ROUNDS ARE NEEDED BY THE OTHER TRUCKS IN THE QUEUE
        INDEX = 15 + 3*I - 1
        NEEDOT = IATP(IPARM(3),INDEX)
C       HOW MANY ROUNDSI ARE AT ATP - JONHND
        JONHND = IATP(IPARM(3),INDEX - 1)
C       IF INSUFFICIENT ON HAND GO TO 4
        IF(JONHND .LT. NEEDOT + NEEDTK)GO TO 4
C       IF NOT ARTY GO TO 5
        IF(MANART .EQ. 2)GO TO 5
C       HAVE ARTY IS THERE SUFFICIENT POWDER
C      HOW MANY RDS ARE NEEDED BY ALL ARTY TRKS IN QUEUE
        TOLRDS = IATP(IPARM(3),26) + IATP(IPARM(3),29)
        IF(IATP(IPARM(3),22) .GE. TOLRDS + NEEDTK)GO TO 5
C       INSUFFICIENT AMMO SEND TO ASP
C       FIND DIST TO ASP
      4 DIST = IATP(IPARM(3),2)
C       FIND TRUCK RATE OF MOVEMENT - RATE
        ITKTYP = ITRUCK(IPARM(2),1)
        RATE = ITYPE(ITKTYP,IDAY+3)
        TRTM = DIST / RATE * 60.
C       CHANGE TRUCK STATUS CODE
        ITRUCK(IPARM(2),3) = 5
C       COMPUTE DELAY DUE TO FAILURE - TFAIL
        CALL OPERA(IPARM(2),TRTM,TFAIL)
C       COMPUTE INTERDICTION DELAY - TMIND
        CALL INTRDK(IPARM(2),TMIND)
C       ICOMPUTE ASP ARRIVAL TIME - TOTTIM
        TOTTIM = TIME +TRTM + TFAIL + TMIND
        IPARM(3) = IUNIT(IPARM(1),3)
        CALL SCHED(5,IPARM,TOTTIM)
        GO TO 25
      5 CONTINUE
C       HAVE AMMO ON HAND
C       FIND QUEUE NUMBER - NUMQ
        NUMQ = IATP(IPARM(3),MANART + 10)
        CALL PUTQUE(IPARM(2),NUMQ)
        ITRUCK (IPARM(2), 3) = 2
C       ADD TO QUEUE DEMAND FOR AMMO TYPE
        JLOOP = LPPAR(2)
        DO 10 I = 1,JLOOP
        INDEX = 15+ 3*I - 1
        IATP(IPARM(3),INDEX) = IATP(IPARM(3),INDEX) + IMIX(MIX,I)
C**** IF ARTY ADD TO POWDER , IF NOT GO TO 10
        IF(MANART.EQ.2) GO TO 10
        IATP(IPARM(3),23)=IATP(IPARM(3),23)+IMIX(MIX,I)
     10 CONTINUE
```

```
C     INCREMENT NUMBER OF TRUCKS IN THE QUEUE
      IATP(IPARM(3),MANART +13) = IATP(IPARM(3),MANART+13) + 1
C**** IF QUEUE HAS NOT BEEN USED SCHEDULE ATP NOW
      IFLAG=8
      IF(MANART.NE.1) IFLAG=13
      IF(IATP(IPARM(3),IFLAG).EQ.1) GO TO 25
      IATP(IPARM(3),IFLAG)=1
      IPARM(1) = MANART
      IPARM(2) = IPARM(3)
      CALL SCHED(6,IPARM,TIME)
   25 CONTINUE
      RETURN
      END
```

j. SUBROUTINE: ATPAR1

PURPOSE: Process the arrival of a CSA-ATP truck at the ATP.

COMMON BLOCKS: LOG

CALLS: IQ
PUTQUE

IS CALLED BY: ARM Driver

```
CALLING PARAMETERS:  IPARM (5) - (1) -- ATP Number
                                 (2) -- Truck Number
```

LOCAL ARRAYS: None.

FUNCTIONS:

Determine the ammunition carried on the truck.

Update the ammunition available and place the truck in the CSA-ATP queue.

```
      SUBROUTINE ATPAR1 (IPARM)
C***** EVENT ATPAR1  --  ARRIVAL OF TRUCK AT ATP FROM CSA
C
C***** J. FOX       JAN 79
C
C***** IPARM(1) -- ATP NUMBER
C***** IPARM(2) -- TRUCK NUMBER
C
C***** SCHEDULES     --      NOTHING
C
C***** PUTS TRUCK IN CSA-ATP QUEUE
C
C***** CHANGES        --   ATP AMMO SUPPLY.
C
      COMMON /LOG/ IATP(4,20), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(5,6), IMIX(40,23), INTEF(3),
     Z  IRSTYP(20,3), IATPSQ(5), IDAY, TIME,
     Z  ICSA(20), LPEAK(7), IASPAM(4,20), LOOUT, ICIST, TCILNG, LOOK(17)
      DIMENSION IPARM(5)
C
C***** LOCAL VARIABLES
C***** MIX -- MIX OF AMMO INDEX CARRIED ON THE TRUCK FROM THE CSA
C***** INDEX -- NUMBER OF QUEUE FOR CSA - ATP TRUCKS
C***** IND -- INDEX FOR CURRENT AMMO SUPPLY BASE ON IATP DEFINITION
C***** JLOOP - TOP OF DO LOOP FROM COMMON LPPAR = NOT AMMO CODES AT ATP
C
C***** FIND THE MIX ON THE TRUCK
      MIX = ITRUCK(IPARM(2), 5)
      IF(MIX.GT.0) GO TO 1
      WRITE (6,2) IPARM(2)
    2 FORMAT(" ATPAR1 -- ZERO MIX ON TRUCK ",I4)
      RETURN
    1 CONTINUE
```

```
C
C***** PUT TRUCK IN CSA-ATP AMMO QUEUE
      INDEX = IQ(2, IPARM(1))
      CALL FUTQU (IPARM(2), INDEX)
C
C***** ADD AMMO TO THAT AVAILABLE
      JLOOP = LPPARM(2)
      DO 5 I = 1,JLOOP
      IND = 15 + 2*I - 2
      IATP(IPARM(1),IND) = IATP(IPARM(1),IND) + (IMIX(MIX,I)
     Z * ITRUCK(IPARM(2),6) + 99)/1
    5 CONTINUE
C
C***** UPDATE TRUCK STATUS TO THE CSA-ATP QUEUE
      ITRUCK(IPARM(2), 3) = 2
C
      RETURN
      END
```

k. SUBROUTINE: ATPAR2

PURPOSE: Processes the arrival of an ASP-ATP truck at the Ammunition Transfer Point (ATP).

COMMON BLOCKS: LOG

CALLS: IQ
PUTQUE

IS CALLED BY: ARM Driver

CALLING PARAMETERS: IPARM (5) - (1) -- ATP Number
(2) -- Truck Number

LOCAL ARRAYS: None.

FUNCTIONS:

Determines the ammunition mix on the truck.

Updates the IATP for ammunition available.
Places truck in ASP-ATP queue.

```
      SUBROUTINE ATPAR2 (IPARM)
C***** VER ATPAR2 --  ARRIVAL OF TRUCK AT ATP FROM ASP
C
C***** J. FOX       JAN 79
C
C***** IPARM(1) -- ATP NUMBER
C***** IPARM(2) -- TRUCK NUMBER
C
C***** SCHEDULES     --      NOTHING
C
C***** PUTS TRUCK IN ASP-ATP QUEUE
C
C***** CHANGES        --  ATP AMMO SUPPLY.
C
      COMMON /LOG/ IATP(4,71), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(3),
     Z  IRTIME(20,3), IATPSU(5), IDAY, TIME,
     &  ICRA(23), LPPAR(6), TAPRAM(4,20), LUOUT, ICISI, TCILNG, LOOK(17)
      DIMENSION IPARM(5)
C
C***** LOCAL VARIABLES
C***** MIX  -- MIX NUMBER OF AMMO CARRIED ON THE TRUCK
C***** INDEX  -- NUMBER OF ATP OUTPUT FOR LOADED AMMO TRUCKS
C***** JLOOP  - TOP OF DO LOOP FROM LPPAR EQUAL TO NUM OF AMMO TYPES
C***** IND -- INDEX FOR CURRENT AMMO SUPPLY BASED ON CURRENT
C*****          IART DEFINED.
C
C***** FIND MIX NUMBER ON TRUCK
      MIX = ITRUCK(IPARM(2), 5)
      IF (MIX.GT.0) GO TO 1
      WRITE (6,2) IPARM(2)
    2 FORMAT(" ATPAR2 -- ZERO MIX ON TRUCK ",I4)
      RETURN
    1 CONTINUE
```

```
C
C**** PUT TRUCK IN ATP AMMO TRUCK QUEUE
      INDEX = 10(3, IPARM(1))
      CALL FUTQUE (IPARM(2), INDEX)
C
C**** ADD AMMO TO AMMO AVAILABLE
      JLOOP = LFPAR(2)
      DO 5 I = 1, JLOOP
      IND = 15 + 3*I - 2
      IATP(IPARM(1),IND) = IATP(IPARM(1),IND) + (IMIX(MIX,I) * ITRUCK
     2     (IPARM(2),5) + 33) / 100
    5 CONTINUE
C
C**** UPDATE TRUCK STATUS TO BEING IN THE ATP QUEUE
      ITRUCK(IPARM(2), 5) = 2
C
      RETURN
      END
```

1. SUBROUTINE: CONTROL

PURPOSE: Enables interactive control to check or edit the data files, schedule control events, schedule a stop simulation event, create events, list or modify the truck assignments, and return to regular processing.

COMMON BLOCKS: LOG

CALLS: CREEVT
EDIT
REPORT
SCHED
TRKPUT

IS CALLED BY: ARM Driver

CALLING PARAMETERS: TIME -- Present model battle time.

LOCAL ARRAYS: IIPARM(5) -- Used to schedule other events.

FUNCTIONS:

Provides menu of possible functions and requests operator's input.

Reads operator's input and verifies input to be in the valid range.

Branches to perform operator's requested function.

Returns to the first function.

```
      SUBROUTINE CONTROL (TIME)
C***** ALLOWS INTERACTIVE CONTROL FOR DATA EDITING AND REPORTS
C***** ALLOWS SCHEDULING OF NEXT CONTROL TIME.
C***** H. JONES    FEB 79
      DIMENSION IPARM(5)
C
   1  WRITE(2,2 ) TIME
   2  FORMAT(" TIME = ",F8.2,/,
     Z     " (1) - EDIT DATA ",/,
     Z     " (2) - WRITE REPORT ",/,
     Z     " (3) - SCHEDULE CONTROL ",/,
     Z     " (4) - RETURN ",/,
     Z     " (5) - STOP SIMULATION NOW ",/,
     Z     " (6) - EDIT TRUCK QUEUES ",/,
     Z     " (7) - CREATE EVENTS",/,
     Z     "   ?    ")
      READ(1,*) IOPT
      IF(IOPT .LT. 1 .OR. IOPT .GT. 7) GO TO 1
      GO TO (30, 40, 50, 70, 60, 65,67), IOPT
C
C***** EDIT DATA
   30 CALL EDIT
      GO TO 1
C
C***** WRITE REPORT
   40 WRITE(2,45)
   45 FORMAT(" ENTER REPORT TYPE #    ")
      READ(1,*) NUM
      CALL REPORT (NUM)
      GO TO 1
C
C***** SCHEDULE CONTROL
   50 WRITE(2,55)
   55 FORMAT(" ENTER TIME FOR NEXT CONTROL    ")
      READ(1,*) TNEXT
      CALL SCHED (18, IPARM, TNEXT)
      GO TO 1
C
C***** STOP SIMULATION.
   60 IPARM(1) = "STOP SCHED"
      IPARM(2) =             "ULED FOR"
      IPARM(3) =                       " CONTROL"
      IPARM(4) = "  "
      CALL SCHED (17, IPARM, TIME + .1)
      GO TO 70
C***** EDIT TRUCK QUEUES
   65 CALL TRKPUT
      GO TO 1
C***** CREATE EVENTS

   67 CALL CREVNT
      GO TO 1
   70 RETURN
      END
```

m. SUBROUTINE: CSAARV

PURPOSE: To receive and process a CSA-ASP or CSA-ATP truck at the Corps Supply Activity (CSA).

COMMON BLOCKS: LOG

CALLS: INTRDK
OPERA
SCHED

IS CALLED BY: ARM Driver

CALLING PARAMETERS: IPARM (5) - (1) -- ATP Number or ASP Number
(2) -- Truck Number
(3) -- 1 if CSA-ATP Truck, 2 if CSA-ASP Truck

LOCAL ARRAYS: None.

FUNCTIONS:

Determines ammunition mix need on the truck.

Update ICSA for the number of rounds taken from the CSA.

Schedule truck returning to ASP or ATP with delays for truck failure or interdiction as appropriate.

```
      SUBROUTINE CSAARV (IPARM)
C**** EVENT CSAARV --  ARRIVAL OF TRUCK AT CSA
C
C**** J. FOX     JAN 79
C
C**** IPARM(1) -- ATP NUMBER OF ASP NUMBER
C**** IPARM(2) -- TRUCK NUMBER
C**** IPARM(3) -- 1 IF ATP,  2 IF ASP
C
C**** SCHEDULES     --  ATPAR1, ARRIVAL OF TRUCK AT ATP
C
C**** CHANGES       --  CSA AMMO SUPPLY.
C
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSTME(20,3), IATPSD(5), IDAY, TIME,
     $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
      DIMENSION IPARM(5)
C
C**** LOCAL VARIABLES :
C**** MIX    -- AMMO MIX NUMBER ON TRUCK
C**** LDTIM  -- TIME TO LOAD TRUCK
C**** DIST   -- DIST BACK TO ASP OR ATP
C**** JLOOP - TOP OF LOOP FROM LPPAR
C**** TRTM   -- TRAVEL TIME
C**** ITKTYP -- TRUCK TYPE
C**** TRKSP  -- TRUCK SPEED
C**** TFAIL -- DELAY ENROUTE DUE TO FAILURE
C**** TOTTIM    -- TIME OF ARRIVAL OF TRUCK BACK TO ATP
C**** TMIND -- INTERDICTION TIME DELAY
C
C**** FIND AMMO MIX TO BE LOADED ON TRUCK
      MIX = ITRUCK(IPARM(2), 5)
C
C**** USE DO LOOP TO PROCESS EACH AMMO TO ADD TO ICSA
C**** THE AMOUNT LOADED.
      JLOOP = LPPAR(1)
      DO 5 I = 1,JLOOP
      ICSA(I) = ICSA(I) + IMIX(MIX, I)
    5 CONTINUE
C
C**** FIND LOAD TIME FOR MIX
      LDTIM = IMIX(MIX, 21)
C
C**** DETERMINE TIME TO RETURN TO ASP OR ATP
C**** (DIST, IF ATP DIST IS IN IATP)
      IF(IPARM(3) .EQ. 2) GO TO 10
C
C**** ATP TRUCK
      DIST = IATP(IPARM(1), 1)
      GO TO 15
C
C**** ASP TRUCK SO IPARM(1) IS ASP NUMB
```

```
   10 DIST = IASP(IPARM(1), 1)
C
C**** DETERMINE TYPE OF TRUCK  (ITKTYP)
   15 ITKTYP = ITRUCK(IPARM(2), 1)
      TRKSP = ITYPE(ITKTYP,IDAY+3)
C
C**** CALCULATE TRAVEL TIME (TRTM)
      TRTM = DIST / TRKSP * 60.
      ITRUCK(IPARM(2),6) = 100
      ITRUCK(IPARM(2),3) = 4
C**** COMPUTE DELAY DUE TO INTERDICTION (TMIND) AND FAILURE (TFAIL)
      CALL INTRDK(IPARM(2), TMIND)
      IF(TMIND .LE. 0)GO TO 30
C**** CHARGE ADDITIONAL AMMO TO CSA
      JLOOP = LPPAR(1)
      DO 35 I = 1,JLOOP
      ICSA(I) = ICSA(I) + IMIX(MIX,I)
   35 CONTINUE
C**** INCREMENT DELAY BY LOAD TIME
      TMIND = TMIND + LDTIM
   30 CONTINUE
      CALL OPERA(IPARM(2), TRTM, TFAIL)
      TOTTIM = TRTM + LDTIM + TIME + TFAIL + TMIND
C
C**** SCHEDULE ATPAR1  (IPARM IS ALREADY OK FOR ATPAR1)
C**** IF ASP TRUCK GO TO 25
      IF(IPARM(3) .EQ. 2) GO TO 25
      CALL SCHED(10,IPARM,TOTTIM)
      GO TO 20
C
C**** HERE WOULD BE LOGIC TO SCHEDULE A CSA TO ASP TRUCK
   25 CONTINUE
      WRITE(2,100)
      STOP
C
   20 RETURN
  100 FORMAT(" NO LOGIC FOR CSA TO ASP LINK")
      END
```

n. SUBROUTINE: DEMAND

PURPOSE: Updates the ammunition required by a unit because of a demand pulse.

COMMON BLOCKS: LOG

CALLS: OPERA
RDIEXO
SCHED

IS CALLED BY: ARM Driver

CALLING PARAMETERS: IPARM (5) - (1) -- Unit Number

LOCAL ARRAYS: None.

FUNCTIONS:

Calls RDIEXO to update IUNIT with the latest demand pulse.

If UNIT is a FARP, moves ammunition from the ground available to aircraft.

If UNIT is artillery, checks to see if critical resupply exists to cause helicopter resupply to be initiated.

Schedules RELOAD event for the unit.

```
      SUBROUTINE DEMAND (IPARM)
C**** EVENT DEMAND --  CHECKS AMMO DEMAND OF UNITS.
C
C**** D. HILLIS  JAN 79
C
C**** IPARM(1) -- UNIT NUMBER
C
C**** SCHEDULES -- RELOAD, RESUPPLY OF UNITS.
C                 HELARV, ARRIVAL OF HELICOPTER AT UNIT
C                 DEMAND, CHECKS DEMAND AGAIN.
C**** LOCAL VARIABLE DEFINITIONS
C**** K - UNIT AMMO INDEX
C**** NFLAG - 0  RELOAD NOT SCHEDULED YET.  1 RELOAD ALREADY SCHEDULED
C**** IFLAG - 0  NORMAL MODE.  1 - 155 HE OR ICM AMMO BELOW CRL
C**** I - UNIT NUMBER
C**** IA - LOOP INDEX
C**** II - LOOP INDEX
C**** JLOOP - TOP OF DO LOOP FROM COMMON LPPAR
C**** TRIM - ROAD TRAVEL TIME
C**** TFAIL - TIME LOST DUE TO REMEDIAL MAINTENANCE
C**** TOTTIM - TIME TO SCHEDULE THE EVENT
C**** IRRL - ROUTINE RESUPPLY LEVEL FOR LIVE WPNS
C**** IBAM - BASIC AMMO LEVEL FOR LIVE WPNS
C**** IRGND - NO. RNDS ON GROUND AT FARP
C
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSTME(20,3), IATPSD(5), IDAY, TIME,
     $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
      DIMENSION IPARM(5)
      I = IPARM(1)
C
      CALL RDIEXO(I)
C     INITIALIZE FLAGS AND COUNTERS
      IFLAG = 0
      NFLAG = 0
C**** SELECT AN AMMO TYPE
      DO 100 KK = 1,5
      K = KK * 12 - 4
      IF(IUNIT(I,K).EQ.0) GO TO 100
      IBAM=IUNIT(I,K+1)*IUNIT(I,K+7)
C**** CHECK FOR A FARP
      IF(IUNIT(I,1).EQ.8) GO TO 50
      IF(IBAM-IUNIT(I,K+4).EQ.0) GO TO 100
C**** CHECK FOR ROUTINE RESUPPLY
      IRRL=IUNIT(I,K+1)*IUNIT(I,K+5)
      IF(IUNIT(I,K+4).GT.IRRL) GO TO 100
      L = IUNIT(I,K)
C**** CHECK FOR 155 ARTY UNIT
      IF(IUNIT(I,1).EQ.4) GO TO 65
C**** IS THERE AMMO OF THIS TYPE ON TRUCKS
   35 IF(IUNIT(I,K+8) .NE. 0)GO TO 40
```

```
      IF(IFLAG .EQ. 1)GO TO 150
      GO TO 100
C**** THERE IS AMMO ON A TRUCK
   40 IF(IFLAG .EQ. 1)GO TO 110
      IF(NFLAG .EQ. 1)GO TO 100
C     SCHEDULE RELOAD IMMEDIATELY
      CALL SCHED(2,IPARM,TIME)
      NFLAG = 1
      GO TO 100
C**** DETERMINE AMMO REQUIREMENT AT FARP
 50   IRGND=IUNIT(I,K+4)-IBAM + IUNIT(I,K+3)
      IF(IUNIT(I,K+3).GT.IRGND) GO TO 55
      IRGND=IRGND-IUNIT(I,K+3)
      IUNIT(I,K+4)=IRGND+IBAM
      IUNIT(I,K+3)=0
      IUNIT(I,K+2) = 0
      WRITE(LUOUT,210) IUNIT(I,K+4),IRGND
 210  FORMAT(" DMD - FARP O/H= ",I5," ON GRND= ",I5)
      GO TO 35
 55   IUNIT(I,K+3)=IUNIT(I,K+3)-IRGND
      IUNIT(I,K+4)=IBAM-IUNIT(I,K+3)
      WRITE(LUOUT,210) IUNIT(I,K+4),IRGND
      GO TO 35
C**** CHECK FOR AMMO TYPES 4 AND 5
   65 IF(IUNIT(I,K) .EQ. 4 .OR. IUNIT(I,K) .EQ. 5)GO TO 70
      GO TO 35
C**** CHECK TO SEE IF CURRENT AMMO SUPPLY GT CRITICAL RESUF LEVEL
   70 IF(IUNIT(I,K+4) .GT. IUNIT(I,K+6)*IUNIT(I,K+1))GO TO 35
      IFLAG = 1
      GO TO 35
C**** COMPARE AVAILABLE AMMO AGAINST CRL
  110 IF(IUNIT(I,K+8) + IUNIT(I,K+4) .GT. IUNIT(I,K+6)*IUNIT(I,K+1))
     ZGO TO 120
      IF(NFLAG .EQ. 1)GO TO 150
      CALL SCHED(2,IPARM,TIME)
      NFLAG = 1
      GO TO 150
  120 IF(NFLAG .EQ. 1)GO TO 130
      CALL SCHED(2,IPARM,TIME)
      NFLAG = 1
  130 IFLAG = 0
      GO TO 100
C**** HELICOPTER RESUPPLY LOGIC
C**** DOES UNIT ALREADY HAVE MAX NUMBER OF HELICOPTERS ASSIGNED
  150 IF(IUNIT(I,68) .EQ. 2)GO TO 170
  190 IF(LPPAR(5) .GT. 0)GO TO 180
      IF(IUNIT(I,68) .EQ. 1)GO TO 160
      WRITE(LUOUT,155)TIME
  155 FORMAT("  AT ",F8.2,"  MIN.  NO HELICOPTERS AVAILABLE ")
C
```

```
      GO TO 170
  160 WRITE(LUOUT,165)TIME
  165 FORMAT("  AT ",F8.2," MIN. HELI SCHEDULED, NO OTHERS AVAIL. ")
  170 IF(NFLAG .EQ. 1)GO TO 200
      IFLAG = 0
      GO TO 100
  180 LPPAR(5) = LPPAR(5) - 1
C***
C     FIND AVAILABLE HELI(MISSION = 5, STATUS = 3)
      JLOOP = LPPAR(4)
      DO 185 II = 1,JLOOP
      IF(ITRUCK(II,2) .NE. 5)GO TO 185
      IF(ITRUCK(II,3) .EQ. 6)GO TO 185
      IF(ITRUCK(II,3) .EQ. 3)GO TO 175
  185 CONTINUE
      WRITE(LUOUT,186)
  186 FORMAT("  CANNOT FIND THE AVAIL HELICOPTER-DEMAND ")
      GO TO 200
C     HAVE HELICOPTER II UPDATE STATUS
  175 ITRUCK(II,3) = 4
C     SCHEDULE ARRIVAL AT UNIT
      IPARM(2) = II
C     FIND TRAVEL TIME TRTM
      TRTM = 60 * IUNIT(IPARM(1),5) / ITYPE(6,IDAY+1)
      CALL OPERA(II,TRTM,TFAIL)
      MIX=ITRUCK(II,5)
      TOTTIM = TIME + TRTM + TFAIL + IMIX(MIX,23)
C     INCREMENT ASP AMMO USED
      JLOOP = LPPAR(1)
      DO 187 IA = 1,JLOOP
      IASPAM(IUNIT(I,3),IA) = IASPAM(IUNIT(I,3),IA) + IMIX(MIX,IA)
  187 CONTINUE
C**** IF HELICOPTER FAILS IN ROUTE TO UNIT
C     SEND ANOTHER HELICOPTER, IF AVAILABLE
C     SCHED HELASP
C     SET STARUS AS DOWN
      IF(TFAIL .LE. 0)GO TO 188
      ITRUCK(II,3)=6
      CALL SCHED(14,IPARM,TOTTIM)
      GO TO 190
  188 IUNIT(I,68) = IUNIT(I,68) + 1
C***
      CALL SCHED(13,IPARM,TOTTIM)
      IATP(1,4) = IATP(1,4) + 1
      IF(IUNIT(I,68) .EQ. 2)GO TO 170
C**** MIX 25 IS FOR THE CH47 HELICOPTER
      IF(IMIX(25,L)+IUNIT(I,K+4).GT.IUNIT(I,K+6)*IUNIT(I,K+1))GO TO 170
      GO TO 190
  100 CONTINUE
  200 RETURN
      END
```

o. SUBROUTINE: ENDSIM

PURPOSE: Writes out LOG, QUENUM, QUEPNT to permanent file (FILE1) to give checkpoint capability.

COMMON BLOCKS: LOG
QUENUM
QUEPNT

CALLS: None

IS CALLED BY: ARM Driver

CALLING PARAMETERS: IPARM (5) - (1) -- Time of Simulation

LOCAL ARRAYS: None.

FUNCTIONS:

Writes COMMONS to mass storage.

Prints ending message.

```
      SUBROUTINE ENDSIM(IPARM)
C**** SIMULATION END
C**** H. JONES    FEB 79
C
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,E9),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSTME(2',3), IATPSD(5), IDAY, TIME,
     $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
      COMMON /QUENUM/ IHEAD(136)
      COMMON /QUEPNT/ ITEMS(560)
      DIMENSION IPARM(5)
C
      WRITE(4) IATP,IASP,IUNIT,ITRUCK,ITYPE,IMIX,INTER,IRSTME,
     Z   IATPSD,IDAY,TIME,ICSA,LPPAR,IASPAM,LUOUT,TCIST,
     Z  TCILNG, IHEAD, ITEMS
C
C**** WRITE MESSAGE
      WRITE(2,10) (IPARM(I), I=1,4), TIME
   10 FORMAT(1X,4A10,/,1X,"TIME = ",F9.3)
C
      RETURN
      END
```

p. SUBROUTINE: HASPAR

PURPOSE: Process the helicopter arriving at the Ammunition Supply Point (ASP) subsequent to carrying ammunition to the unit.

COMMON BLOCKS: LOG

CALLS: None.

IS CALLED BY: ARM Driver

CALLING PARAMETERS: IPARM (5) - (1) -- None.
(2) -- Truck Number.

LOCAL ARRAYS: None.

FUNCTIONS:

Increments the number of helicopters available for a mission.

Changes the status code to--"at the ASP."

Sets percent loaded to 100% for future activities.

```
      SUBROUTINE HASPAR (IPARM)
C**** EVENT HASPAR -- ARRIVAL OF HELICOPTER BACK AT ASP.
C
C**** J. FIX     JAN 79
C
C**** IPARM(1) -- NONE
C**** IPARM(2) -- TRUCK NUMBER
C**** SCHEDULES  --  NOTHING.
C
C**** CHANGE NUMBER OF HELOS IN USE.
C
      COMMON /ZLOG/ IATP(4,30), IASP(4,11), IUNIT(75,69),
     Z  ITRUCK(60,7), ITYPE(6,6), IMIX(40,23), INTCF(3),
     Z  INSTNG(20,7), IAIPSD(5), IDAY, TIME,
     Z  IUSA(20), LPPA(5), IASPAR(4,20), LUOUT, ICIST, ICILNG, LOOK(17)
      DIMENSION IPARM(5)
C
C**** LOCAL VARIABLES  --    NONE
C
C**** INCREMENT NUMBER OF HELICOPTER AVAILABLE FOR USE
      LPPA (5) = LPPA(5) + 1
C
C**** CHANGE STATUS TYPE
      ITRUCK (IPARM(2), 4) = 3
C
      ITRUCK(IPARM(2),6) = 103
      RETURN
      END
```

q. SUBROUTINE: HELARV

PURPOSE: Processes the arrival of a helicopter load of ammunition at a unit.

COMMON BLOCKS: LOG

CALLS: OPERA
SCHED

IS CALLED BY: ARM Driver

```
CALLING PARAMETERS:  IPARM (5) - (1) -- Unit Number.
                                 (2) -- Truck Number.
```

LOCAL ARRAYS: None.

FUNCTIONS:

Determines mix of ammunition carried by the helicopter

Increments ammunition on hand at the unit (IUNIT).

Computes travel time back to the ASP.

Schedules arrival at the ASP (HASPAR).

```
            [illegible]V (I?A??)
         [illegible] / -- ARRIVAL OF HELICOPTER AT UNIT

      .     JAN 79

        (1) -- UNIT NUMBER
       (2) -- TRUCK NUMBER

     [illegible] -- HASCAR, ARRIVAL BACK AT ASP.

    [illegible]  NUMBER OF HELOS IN USE TO SUPPORT THIS UNIT.
               [illegible] AT UNIT.

      [illegible]ON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
   *  ITRUCK(500,7), ITYPE(5,6), IMIX(40,23), INTER(3),
   /  IRTIME(20,3), IATPS0(5), IDAY, TIME,
   [illegible]  [illegible](2?), LPER(5), IASPAM(4,20), JJOUT, TCTST, TCILNG, LOOK(17)
   [illegible]SION IPARM(5)

     LOCAL VARIABLE DEFINITION
 . .. IIX - AMMO MIX INDEX TO COMMON IMIX-
     IMI - INDEX OF CURRENT AMMO SUPPLIES IN IUNIT
 .... IN - INDEX OF TYPE AMMO IN IUNIT
 .... IAMTYP - UNIT IN THE AMMO TYPE
     [illegible] - TRAVEL TIME
     [illegible] - [illegible] LOST DUE TO MAINTENANCE FAILURE
     [illegible] - [illegible] LOST DUE TO [illegible]
 .... [illegible] - TIME OF SCHEDULE EVENT
     FIND THE MIX INDEX CARRIED BY HELICOPTER
     MIX = ITRUCK([illegible](2),5)
     IF(MIX .[illegible]. [illegible]) [illegible]
     [illegible] [illegible] AMMO [illegible] AT THE UNIT
     DO [illegible] I = 1,[illegible]
     [illegible] I[illegible] - [illegible] - .
     [illegible]
```

```
C       FIND UNIT [illegible] AMMO TYPE
        IAMTYP = IUNIT(IPARM(1),IND)
        IUNIT(IPARM(1),IN) = IUNIT(IPARM(1),IN) + IMIX(MIX,IAMTYP)
        IUNIT(IPARM(1),IN-1) = IUNIT(IPARM(1),IN-1) - IMIX(MIX,IAMTYP)
      4 CONTINUE
C       FIND TRAVEL TIME BACK TO ASP
        TT4 = 60 * IUNIT(IPARM(1),5) / ITYPE(5,IDAY+1)
C       FIND THE DELAY ASSOCIATED WITH MECHANICAL FAILURE
        CALL [illegible](IPARM(2),TT4,TFAIL)
C*****  DECREMENT NUMBER OF HELO SERVING THIS UNIT
        IUNIT(IPARM(1),68) = IUNIT(IPARM(1),68) - 1
C       SCHEDULE DELAY AT ASP
        IPARM(1) = IUNIT(IPARM(1),3)
        TOTTIM = TIME + TT4 + TFAIL
        CALL SCHED(14,IPARM,TOTTIM)
C       UPDATE TRUCK STATUS
        ITRUCK(IPARM(2),5) = 4
        ITRUCK(IPARM(2),6) = 1
C
        RETURN
        END
```

r. SUBROUTINE: RELOAD

PURPOSE: Replaces rounds expended at unit weapons from rounds on unit trucks or on the ground.

COMMON BLOCKS: LOG

CALLS: FINTK
INTRDK
IQ
SCHED
MINO

IS CALLED BY: ARM Driver

CALLING PARAMETERS: IPARM (5) - (1) -- Unit Number

LOCAL ARRAYS: None.

FUNCTIONS:

Determines the number of rounds short at the weapons for each ammunition type.

Checks to see if the unit has the ammunition available on trucks.

If ammunition is available, sends trucks to weapons to reload.

If no ammunition is available on the trucks, program checks the next ammunition type.

If a truck is emptied, the program schedules a unit departure subsequent to unloading.

Time lost for truck failure and interdiction losses is considered.

If a truck is only partially emptied, the program schedules a unit arrival subsequent to reloading.

```
      SUBROUTINE RELOAD (IPARM)
C**** EVENT RELOAD  --  REPLACES ROUNDS OF AMMO AT UNIT WEAPONS.
C
C**** D. HILLIS      JAN 79
C
C**** IPARM(1) -- UNIT NUMBER
C
C     EVENTS SCHEDULED --  UNTDEP, DEPARTURE OF UNIT TRUCKS
C                          UNTARV, ARRIVAL OF TRUCKS AT UNIT.
C
C     RELOAD WILL OCCUR AT THE TASK FORCE LEVEL FOR MANEUVER UNITS,
C     BATTERY LEVEL FOR ARTILLERY UNITS AND ADA UNITS, AND AT
C     BATTALION FARRP'S.  THE RELOAD WILL BE CALLED FROM THE DEMAND
C     EVENT.
C
C
C     AMMO WILL BE CONSOLIDATED ON TRUCKS AT UNIT.  NO MORE THAN 1 TRUCK
C     PER UNIT (PER TYPE OF AMMO) WILL BE AT LESS THAN FULL LOAD WHILE
C     LOCATED AT THE UNIT.  A "SMALL LOAD" THRESHOLD MAY BE DEFINED BELOW
C     WHICH AMMO IS DUMPED TO GROUND TO ALLOW TRUCK TO RETURN TO ATP.
C
C**** LOCAL VARIABLE DEFINITION
C**** K - UNIT AMMO INDEX
C**** I - UNIT NUMBER
C**** TOTTIM - TIME OF SCHEDULED EVENT
C**** DELAY - TIME OF RELOAD WEAPONS AT THE UNIT
C**** LOAD - NUMBER OF ROUNDS ON THE TRUCK
C**** ND - AMMO DEMAND
C**** IT - TRUCK NUMBER
C**** NEWLD - TRUCK LOAD ON AMMO DEMAND
C**** II - QUEUE NUMBER OF UNIT
C**** MX - AMMO MIX INDEX
C**** L - AMMO TYPE
C**** KIND - EVENT TYPE
C**** TMIND - DELAY TIME DUE TO INTERDICTION
C**** NRPW - NUMBER OF ROUNDS PER WEAPON
C**** NW - NUMBER OF WEAPONS LOADED PER TRUCK
C**** NNW - NUMBER OF WEAPONS LOADED PER TRUCK TO HANDLE TYPE 8
C**** ICRL - FARP CRITICAL RESUPPLY LEVEL
C**** IBAM - BASIC AMMO LEVEL OF LIVE WPNS
C**** IRGND - NO. OF ROUNDS ON GROUND AT FARP
C**** IFLAG - 0 -FARP TRUCK AVAIL., 1 -NO FARP TRUCK AVAIL.
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSTME(20,3), IATPSD(5), IDAY, TIME,
     $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
      DIMENSION IPARM(5)
C
      I = IPARM(1)
      II = IQ(1,I)
C**** SELECT AN AMMO TYPE
      DO 100 KK=1,5
      IFLAG=0
      K=12 * KK - 4
      L = IUNIT(I,K)
      IF(L.EQ.0) GO TO 100
C**** IS THERE AMMO AVAILABLE ON THE TRUCKS
      IF(IUNIT(I,K+8) .EQ. 0)GO TO 100
C**** CALCULATE AMMO DEMAND
   10 ND = IUNIT(I,K+7) * IUNIT(I,K+1) - IUNIT(I,K+4)
      IF(IUNIT(I,1).EQ.8) ND=IUNIT(I,K+3)
      WRITE(LUOUT,200)L,ND
  200 FORMAT("  RELOAD AFTER IQ",2I5)
      IF(IUNIT(I,1).EQ.8) GO TO 60
      IF(ND .LE. 0)GO TO 100
C**** PULL TRUCK FROM QUEUE
   20 CALL FINTK(II,L,IT)
      WRITE(LUOUT,201)IT
  201 FORMAT("  RELOAD AFTER FINTK ",I5)
      IF(IUNIT(I,1).EQ.8.AND.IT.EQ.0) GO TO 62
      IF(IUNIT(I,1).EQ.8) GO TO 30
      IF(IT .EQ. 0)GO TO 100
C**** CHECK FOR INTERDICTION
      CALL INTRDK(IT,TMIND)
      IF(TMIND .EQ. 0)GO TO 30
      TOTTIM = TIME + TMIND
      IPARM(2) = IT
      IPARM(3)=IUNIT(I,3)
C**** SCHEDULE ASPARV FOR EMPTY TRUCK
      CALL SCHED(5,IPARM,TOTTIM)
      MX=ITRUCK(IT,5)
C**** DECREMENT UNIT AMMO ON TRUCKS
      IUNIT(I,K+8) = IUNIT(I,K+8) - (IMIX(MX,L) * ITRUCK(IT,6)+99)/100
C**** THIS LOGIC IS HERE TO SOLVE THE PROBLEM OF WEAPON
C**** SYSTEMS HAVING DIFFERENT BASIC LOADS FOR THE SAME AMMO
      IF(IUNIT(I,1).NE.1 .AND. IUNIT(I,1).NE.2) GO TO 20
      IF(IUNIT(I,K).NE.2) GO TO 20
      DO 2 JJ=8,56,12
      IF(K.EQ.JJ) GO TO 2
      IF(IUNIT(I,K).EQ.IUNIT(I,JJ)) GO TO 52
 2    CONTINUE
C     NO EQUAL AMMO FOUND FOR 2 IN THIS UNIT GO TO 20
      GO TO 20
C
 52   IUNIT(I,JJ+8)=IUNIT(I,JJ+8)-(IMIX(MX,L)*ITRUCK(IT,6)+99)/100
      GO TO 20
C**** DETERMINE CRITICAL RESUPPLY AT FARP
   60 ICRL = IUNIT(I,K+1) * IUNIT(I,K+6)
      IBAM=IUNIT(I,K+1)*IUNIT(I,K+7)
      WRITE(LUOUT,203) ICRL,IBAM,IUNIT(I,K+4)
 203  FORMAT(" CRL= ",I5," BAM= ",I5," CURRENT= ",I5)
      IF(IUNIT(I,K+4)-IBAM.GT.ICRL) GO TO 65
      GO TO 20
   30 MX = ITRUCK(IT,5)
```

```
C**** CALCULATE THE TRUCK AMMO LOAD
      LOAD = (IMIX(MX,L) * ITRUCK(IT,6) + 99) / 100
C**** CHECK AMMO DEMAND AGAINST TRUCK LOAD
C     IF UNIT TYPE 8 UNLOAD THE WHOLE TRUCK
      IF(ND .LT. LOAD .AND. IUNIT(I,1) .NE. 8)GO TO 50
      ITRUCK(IT,6) = 0
      NEWLD = LOAD
      KIND = 3
C**** CALCULATE UNLOAD TIME FOR TRUCK
C**** CALCULATE THE NUMBER OF ROUNDS PER WEAPON
   40 NRPW = ND / IUNIT(I,K+2)
C**** CALCULATE THE NUMBER OF WEAPONS LOADED PER TRUCK
      NW = MIN0(LOAD / NRPW,IUNIT(I,K+2))
C**** CALCULATE THE RELOAD TIME
      NNW = NW
      IF(IUNIT(I,1) .EQ. 8)NNW = 1
      IF(IUNIT(I,1).EQ.8) NRPW=LOAD
      DELAY = 2 * IRSTME(L,3) + NNW * (IRSTME(L,1) +
     Z    IRSTME(L,2) * NRPW / 100)
      TOTTIM = TIME + DELAY
      IPARM(2) = IT
C**** SCHEDULE A UNTARV OR UNTDEP DEPENDING ON VALUE OF KIND
      CALL SCHED(KIND,IPARM,TOTTIM)
C**** ADJUST AMMO ON TRUCKS AND CURRENT AMMO SUPPLY
      IUNIT(I,K+8) = IUNIT(I,K+8) - LOAD
C**** THIS LOGIC IS HERE TO SOLVE THE PROBLEM OF WEAPON
C**** SYSTEMS HAVING DIFFERENT BASIC LOADS FOR THE SAME AMMO
      IF(IUNIT(I,1).NE.1 .AND. IUNIT(I,1).NE.2) GO TO 45
      IF(IUNIT(I,K).NE.2) GO TO 45
      DO 1 JJ=8,56,12
      IF(K.EQ.JJ) GO TO 1
      IF(IUNIT(I,K).EQ.IUNIT(I,JJ)) GO TO 42
 1    CONTINUE
C     NO EQUAL AMMO 2 IN THIS UNIT GO TO 45
      GO TO 45
 42   IUNIT(I,JJ+8)=IUNIT(I,JJ+8)-LOAD
   45 IUNIT(I,K+4) = IUNIT(I,K+4) + NEWLD
      IF(IUNIT(I,1).EQ.8) GO TO 60
C     DECREMENT THE NUMBER OF ROUNDS SHORT
      IUNIT(I,K+3) = IUNIT(I,K+3) - NEWLD
      IUNIT(I,K+2) = IUNIT(I,K+2) - NW
      IF(IUNIT(I,1).EQ.8) GO TO 20
      GO TO 10
 62   IFLAG = 1
   65 IBAM=IUNIT(I,K+1)*IUNIT(I,K+7)
      IRGND=IUNIT(I,K+4)-IBAM
      IF(IUNIT(I,K+3).GT.IRGND) GO TO 70
      IRGND=IRGND-IUNIT(I,K+3)
      IUNIT(I,K+2)=0
      IUNIT(I,K+3)=C
      IUNIT(I,K+4)=IBAM+IRGND
      GO TO 100
 70   IUNIT(I,K+3)=IUNIT(I,K+3)-IRGND
```

```
      IUNIT(I,K+4)=IBAM-IUNIT(I,K+3)
      IF(IFLAG.NE.1) GO TO 60
      GO TO 100
C**** CALCULATE THE PARTIAL LOAD OF THE TRUCK
  50   ITRUCK(IT,6) = 100 * (LOAD - ND)/IMIX(MX,L)
      NEWLD = ND
      KIND = 8
       GO TO 40
 100   CONTINUE
C
      RETURN
      END
```

s. SUBROUTINE: REPORT

PURPOSE: Provides a variety of reports to the operator given the present status of the battle.

COMMON BLOCKS: LOG

CALLS: None.

IS CALLED BY: CONTRL

CALLING PARAMETERS: IPARM (5) - (1) -- Number of Report Desired

LOCAL ARRAYS: IWPN (20) -- Alpha description of the ammunition codes.

FUNCTIONS:

Branches to the major part of the code reference by the type report requested in the CALLING PARAMETERS.

Requests additional information from the operator as required.

Accepts the additional input and produces the resultant report.

```
      SUBROUTINE REPORT (IPARM)
C**** WRITES REPORTS OF VARIOUS TYPES.
C**** J FOX    FEB 79
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSTME(20,3), IATPSD(5), IDAY, TIME,
     $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
      DIMENSION IPARM(5),IWPN(20)
C
      DATA IWPN/4HTANK,3HTOW,4HPWDR,5H155HE,6H155ICM,6H155SMK,
     Z  7H155CLGP,5H8INHE,6H8INICM,4HGSRS,6HMORTAR,5HDIVAD,3HAAH,4HAH1G,
     Z 7HSTINGER,6HDRAGON,8HBUSHMSTR/
      KIND = IPARM(1)
      IF(KIND .LE. 0 .OR. KIND .GT. 9)RETURN
      GO TO (10, 20, 30,40,50,60,70,80,20), KIND
C
C**** REPORT TYPE ONE
   10 CONTINUE
C**** ITRUCK  UNIT TRUCK REPORT
   15 WRITE(2,325)
  325 FORMAT(/," UNIT TRUCK REPORT PRINT OPTIONS:",/,
     Z   "  1 - PRINT ALL",/,
     Z   "  2 - SINGLE UNIT",/,
     Z   "  3 - RETURN",/,
     Z   "  ?  ")
      READ(1,*) IANS
      IF(IANS.LT.1.OR.IANS.GT.3) GO TO 15
      GO TO (150,160,170) IANS
C**** CYCLE THROUGH THE UNITS
  150 DO 100 I = 1,75
C**** IF TYPE UNIT IS ZERO, CONSIDER INACTIVE BYPASS
      IF(IUNIT(I,1) .EQ. 0)GO TO 100
C**** IF UNNAMED UNIT GO TO 100
      IF (IUNIT(I,7) .EQ. "   ")GO TO 100
      CALL TRUCK (N)
      IF(KIND.EQ.9)   RETURN
      IF(IANS .EQ. 2) GO TO 420
  100 CONTINUE
  170 IF(KIND .EQ. 9)GO TO 20
      GO TO 90
  160 WRITE(2,290)
      READ(1,300) NAME
      IF(NAME .EQ. "0") GO TO 15
      DO 110 K=1,75
      IF(IUNIT(K,1).EQ.0)GO TO 110
      IF(IUNIT(K,7).EQ.NAME) GO TO 115
  110 CONTINUE
      WRITE(2,431) NAME
      GO TO 160
  115 WRITE(LUOUT,200) IUNIT(K,7)
  200 FORMAT(1X,///,8X, " TRUCK STATUS REPORT FOR UNIT ",A10,///,
     Z   "     TRK    NM  STATUS    MIX PCLOAD NXFAIL",/)
      DO 120 KK=1,560
      IF(ITRUCK(KK,4).NE.K) GO TO 120
      NXFAIL=ITYPE(ITRUCK(KK,1),5)-ITRUCK(KK,7)
      WRITE(LUOUT,205) KK,ITRUCK(KK,2),ITRUCK(KK,3),ITRUCK(KK,5),
     Z ITRUCK(KK,6),NXFAIL
  205 FORMAT(2X,6I7)
  120 CONTINUE
      GO TO 160
C****
C**** REPORT TYPE TWO
   20 CONTINUE
C**** IUNIT REPORT
   25 WRITE(2,285)
  285 FORMAT(/," UNIT STATUS PRINT OPTIONS: ",/,
     Z   "  1 - PRINT ALL",/,
     Z   "  2 - SINGLE UNIT",/,
     Z   "  3 - RETURN",/,
     Z   "  ?  ")
      READ(1,*) IANS
      IF(IANS.LT.1.OR.IANS.GT.3) GO TO 25
      GO TO (350,420,410) IANS
C**** LOOP THROUGH UNITS
  350 DO 400 I = 1,75
C**** IF NO TYPE CODE BYPASS
      IF(IUNIT(I,1) .EQ. 0)GO TO 400
C**** IF NO UNIT NAME GO TO 400
      IF(IUNIT(I,7).EQ."    ") GO TO 400
C**** PRINT HEADER
      WRITE(LUOUT,210)
  210 FORMAT(42X,///," UNIT STATUS",43X,"UNIT DATA",29X,"WPN DATA",//
     Z,15X,"AMMO-CODE   WPN-TYP  WPN-ALIVE CUR-SUP RNDS-SHORT PCBL-W ON-
     ZTRKS  NO WPN SH / NO SH EA TOT-DMD " )
      WRITE(LUOUT,215)IUNIT(I,7),IUNIT(I,1),IUNIT(I,2),IUNIT(I,4),
     Z   IUNIT(I,3),IUNIT(I,5),IUNIT(I,68)
  215 FORMAT(1X,A10,I4,/," SER ATP ",I2,I3," KM",/," SER ASP ",I2,I3," K
     ZM",/, "  NO HELO ",I2)
      DO 395 J = 1,5
      JJ = 12 * J - 4
      IF(IUNIT(I,JJ) .EQ. 0)GO TO 395
      NMSHT=0
      IF(IUNIT(I,JJ+2).EQ.0) GO TO 216
      NMSHT = IUNIT(I,JJ+3) / IUNIT(I,JJ+2)
  216 CONTINUE
      IPCBL=100*IUNIT(I,JJ+4)/(IUNIT(I,JJ+1)*(IUNIT(I,JJ+7))
      WRITE(LUOUT,220)IUNIT(I,JJ),IWPN(IUNIT(I,JJ)),IUNIT(I,JJ+1),IUNIT(
     ZI,JJ+4),IUNIT(I,JJ+3),IPCBL,IUNIT(I,JJ+8),IUNIT(I,JJ+2),NMSHT,
     Z    IUNIT(I,JJ+11)
  220 FORMAT(18X,I3,6X,A8,I7,I8,5X,I5,4X,I6,2X,I5,8X,I4," / ",I4,5X,I5)
  395 CONTINUE
C**** PRINT STATUS OF UNIT TRUCKS
      N = I
      CALL TRUCK (N)
  400 CONTINUE
  410 IF(KIND .EQ. 9)GO TO 30
```

```
      GO TO 90
  420 WRITE(2,290)
  290 FORMAT(" ENTER JIFFY UNIT ID (INPUT 0 TO EXIT)  ")
      READ(1,300) NAME
      IF (NAME .EQ. "0") GO TO 25
  300 FORMAT(A10)
      DO 430 K=1,75
      IF(IUNIT(K,1).EQ.0) GO TO 430
      IF(IUNIT(K,7).EQ.NAME) GO TO 435
  430 CONTINUE
      WRITE(2,431) NAME
  431 FORMAT(" UNIT ",A10," NOT FOUND")
      GO TO 420
  435 WRITE(LUOUT,310) NAME
  310 FORMAT(/,1X,"UNIT",1X,A10,4X,"UNIT DATA",22X,"WPN DATA",/,10X,
     Z "WPN",10X,"RNDS",18X,"# WPN # RND",/,1X,"WPN-TYP",2X,
     Z "LIVE CUR-SUP SHORT  PCBL ON-TRKS",3X,"SHORT SH EA TOT-DMD")
      DO 385 KK=8,56,12
      IF(IUNIT(K,KK).EQ.0) GO TO 385
      NMSHT=IUNIT(K,KK+3)/IUNIT(K,KK+2)
      IPCBL=100*IUNIT(K,KK+4)/(IUNIT(K,KK+1)*IUNIT(K,KK+7))
      WRITE(LUOUT,320) IWPN(IUNIT(K,KK)),IUNIT(K,KK+1),IUNIT(K,KK+4),
     Z IUNIT(K,KK+3),IPCBL,IUNIT(K,KK+8),IUNIT(K,KK+2),NMSHT,
     Z IUNIT(K,KK+11)
  320 FORMAT(1X,A8,1X,I3,2X,I5,2X,I3,2X,I6,4X,I4,2X,I5,1X,I5)
  385 CONTINUE
C**** PRINT STATUS OF UNIT TRUCKS
      N = K
      CALL TRUCK (K)
      GO TO 420
C
C**** REPORT TYPE THREE
   30 CONTINUE
C**** SINGLE ATP REPORT - HOW MANY ACTIVE ATP'S ?
      PRINT (2,*) " ENTER NUMB OF ACTIVE ATPS (1,2,3,OR4)"
      READ (1,*)  NATP
      IF (NATP .LT. 1 .OR. NATP .GT. 4) NATP = 4
      DO 475 I = 1,NATP
      WRITE(LUOUT,235)I,IATP(I,9),IATP(I,10),IATP(I,14),IATP(I,15)
  235 FORMAT(////,55X," ATP STATUS ",//,5X,"ATP NO ",I3,//,
     Z    10X,"QUEUE          ARTY             MU",/,10X,
     Z    "SERVERS ACTIVE",2X,I3,8X,I3,/,10X,"TRUCKS IN Q",
     Z    5X,I3,8X,I3,///,10X,"AMMO-CODE  CUR-DMD AMT-O/H BASIC-LVL")
      DO 470 J = 1,5
      JJ = J * 3 + 13
      WRITE(LUOUT,240)J,IATP(I,JJ+1),IATP(I,JJ),IATP(I,JJ+2)
  240 FORMAT(13X,I3,4X,I4,4X,I6,4X,I6)
  470 CONTINUE
  475 CONTINUE
      IF(KIND .EQ. 9)GO TO 40
C
      GO TO 90
C
```

```
C**** REPORT TYPE 4
   40 CONTINUE
C**** IASP REPORT - HOW MANY ASPS
      PRINT (2,*) " ENTER NUMBER OF ACTIVE ASPS,1,2,3,OR4"
      READ (1,*) NASP
      IF (NASP .LE. 0 .OR. NASP .GT. 4 )NASP = 4
      DO 500 I = 1, NASP
C**** OUTPUT INFO
      WRITE(LUOUT,245)I,IASP(I,7),IASP(I,8),IASP(I,12),IASP(I,13)
  245 FORMAT(1X,////,55X," ASP STATUS ",///,5X," ASP-NO ",I3,///,
     Z 15X,"QUEUE        ROUTINE        GSRS",//,10X,"SERVERS ACTIVE",
     Z 2X,I5,8X,I5,/,10X,"TRUCKS IN Q",5X,I5,8X,I5,///," INVENTORY
     ZAMMO-CODE AMT-O/H")
      JLOOP=LPPAR(1)
      DO 495 J = 1,JLOOP
      JJ = J + 13
      WRITE(LUOUT,250)J,IASP(I,JJ)
  250 FORMAT(19X,I3,4X,I8)
  495 CONTINUE
  500 CONTINUE
      IF(KIND .EQ. 9)GO TO 50
      GO TO 90
C
C
C**** REPORT TYPE FIVE
C**** ICSA REPORT
   50 CONTINUE
      WRITE(LUOUT,225)
  225 FORMAT(1X,////,55X," CSA-STATUS ",//,50X," ROUNDS DRAWN FROM CSA",
     Z  /21X," AMMO ",10X,"NUMBER-DRAWN ")
      JLOOP=LPPAR(1)
      DO 450 I = 1,JLOOP
      WRITE(LUOUT,230)I,ICSA(I)
  230 FORMAT(22X,I3,14X,I6)
  450 CONTINUE
      IF(KIND .EQ. 9)GO TO 60
C
      GO TO 90
C
C**** REPORT TYPE SIX
C**** MULTIPLE ATP REPORT
   60 CONTINUE
C**** LOOP THROUGH ATP'S
C**** WRITE HEADERS
      WRITE(LUOUT,255)
  255 FORMAT(1X,////,45X," ATP STATUS - COMMAND INFO ",//,60X,
     Z" AMMO INVENTORY",/,5X,"ATP NO   QUEUE   TRKS      1     2     3
     Z    4     5")
      DO 600 I = 1,4
      WRITE(LUOUT,260)I,IATP(I,15),IATP(I,16),IATP(I,19),IATP(I,14),
     Z    IATP(I,22),IATP(I,25),IATP(I,28)
  260 FORMAT(9X,I2,"    MU ",I7,6X,I4,I6,,/,15X,"ARTY",I6,18X,3I5)
  600 CONTINUE
```

```
      IF(KIND .EQ. 9)GO TO 70
C
      GO TO 90
C****C****
C**** REPORT TYPE SEVEN
   70 CONTINUE
      PRINT (2,*) " ENTER NUMBER OF ACTIVE ASPS "
      READ (1,*) NASP
      IF (NASP.LE.0.OR.NASP.GT.4) NASP = 4
C**** AMMO REMOVED FROM ASPS
C**** WRITE HEADER
      WRITE(LUOUT,265)
C     LOOP THROUGH ASPS
      DO 700 I = 1,NASP
      WRITE (LUOUT,265) I
  265 FORMAT (//,20X,"ASP ",I2,10X,"AMMO TYPE",10X,"AMMO REMOVED")
      DO 690 J= 1,20
      WRITE (LUOUT,270) J,IASPAM(I,J)
  270 FORMAT (40X,I2,15X,I7)
  690 CONTINUE
  700 CONTINUE
      IF(KIND .EQ. 9)GO TO 80
C
C
      GO TO 90
C**** REPORT TYPE EIGHT
C**** TRUCKS THAT HAVE BEEN KILLED OR HAVE BROKEN
   80 CONTINUE
C**** LOOP THROUGH TRUCKS FOR DEAD
      LOOP = LPPAR(4)
      DO 800 I = 1,LOOP
C**** IF NOT DEAD, GO TO 800
      IF(ITRUCK(I,3) .NE. 7)GO TO 800
C**** HAVE DEAD TRUCK, PRINT NUT
      WRITE(LUOUT,275)I,IUNIT(ITRUCK(I,4),7),ITRUCK(I,1),ITRUCK(I,5)
  275 FORMAT(" TRUCK NUMB",I4," OF UNIT ",A10," WHICH IS TYPE "I4," CARR
     ZYING AMMN",I4," IS DEAD")
  800 CONTINUE
      DO 810 I = 1,LOOP
C**** IF NOT BEING REPAIRED GO TO 810
      IF(ITRUCK(I,3) .NE. 6)GO TO 810
C**** HAVE BROKEN TRUCK, PRINT INFO
      ISAVE=IUNIT(ITRUCK(I,4),7)
      IF(ITRUCK(I,2).NE.1) ISAVE="NON-UNIT"
      WRITE(LUOUT,280)I,ISAVE,ITRUCK(I,1),ITRUCK(I,5)
  280 FORMAT(" TRUCK NUMB",I4," OF UNIT ",A10," WHICH IS TYPE ",I3,
     Z     "CARRYING AMMO MIX"I4," IS BEING REPAIRED")
  810 CONTINUE
   90 RETURN
      END
```

t. SUBROUTINE: UNTARV

PURPOSE: Processes the arrival of a unit truck from the ASP, ATP or reloading event.

COMMON BLOCKS: LOG

CALLS: IQ
PUTQUE
SCHED

IS CALLED BY: ARM Driver

CALLING PARAMETERS: IPARM (5) - (1) -- Unit Number
(2) -- Truck Number

LOCAL ARRAYS: None.

FUNCTIONS:

Determines the mix of ammunition on the truck.

Puts the truck in the unit queue.

Changes the truck statu- code.

Updates the ammunition available at unit trucks.

If a reload is necessary, schedules a reload.

AD-A088 068   ARMY COMBINED ARMS STUDIES AND ANALYSIS ACTIVITY FOR--ETC F/G 19/1
AMMUNITION RESUPPLY MODEL. VOLUME II. PROGRAMMERS MANUAL.(U)
MAR 80 D J REMEN, R B CLARKE, J FOX
UNCLASSIFIED   CASAA-TR-2-80-VOL-2   NL

2 OF 3
AD
A088066

```
      SUBROUTINE UNTARV (IPARM)
C**** EVENT UNTARV  --  ARRIVAL OF TRUCK AT UNIT.
C
C**** J. FOX     JAN 79
C
C**** IPARM(1) -- UNIT NUMBER
C**** IPARM(2) -- TRUCK NUMBER
C
C**** SCHEDULES     --  RELOAD IF DEMAND EXISTS.
C
C**** CHANGES       --  UNIT AMMO ON TRUCKS
C                   --  UNIT TRUCK QUEUE
C
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSTME(20,3), IATPSD(5), IDAY, TIME,
     $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
      DIMENSION IPARM(5)
C
C**** LOCAL VARIABLES :
C**** MIX   -- INDEX OF AMMO MIX
C**** IND   -- INDEX FOR IUNIT AMMO TYPE
C**** INDEX -- AMMO TYPE FOR UNIT AMMO TYPE I
C**** JLOOP - TOP OF LOOP FROM LPPAR
C**** NUMR  -- NUMBER OF ROUNDS OF TYPE INDEX ON THE TRUCK
C**** IRESFL-- RESUPPLY FLAG  (0 = NO RESUP,  1 = SCHED RESUP)
C**** IPR   -- UNIT TRUCK QUEUE NUMBER
C
C**** INITIALIZE RELOAD FLAG
      IRESFL = 0
C
C**** DETERMINE AMMO MIX
      MIX = ITRUCK(IPARM(2), 5)
      IF(MIX.GT.0) GO TO 1
      WRITE(2,6) IPARM(2)
    6 FORMAT(1X,"UNTARV -- ZERO MIX ON TRUCK ",I3)
      RETURN
C
C**** PUT TRUCK IN UNIT QUEUE
    1 IPR = IQ(1, IPARM(1))
      CALL PUTQUE(IPARM(2), IPR)
C
C**** CHANGE TRUCK STATUS CODE
      ITRUCK(IPARM(2), 3) = 1
C
C**** ADD AMMO TO UNIT AVAILABLE AMMO AND CHECK FOR GENERATING RELOAD
      JLOOP = LPPAR(2)
      DO 5 I = 1,JLOOP
      IND = I*12 - 4
      INDEX = IUNIT(IPARM(1), IND)
      IF(INDEX.EQ.0) GO TO 5
C
C**** IF NO AMMO OF THIS TYPE ON TRUCK GO TO 5
```

```
      NUMBER = (IMIX(MIX,INDEX) * ITRUCK(IPARM(2),6) + 99) / 100
      IF(NUMR .LE. 0) GO TO 5
C
C**** HAVE THIS TYPE OF AMMO, ADD TO UNIT
      IUNIT(IPARM(1), IND+8) = IUNIT(IPARM(1),IND+8) + NUMR
C
C**** IF NOT A FARP GO TO 4
      IF(IUNIT(IPARM(1),1).NE.8) GO TO 4
C**** IF NO RELOAD GO TO 5
      IF(IUNIT(IPARM(1),IND+4).GT.IUNIT(IPARM(1),IND+1)*IUNIT(IPARM(1),I
     ZND+7)+IUNIT(IPARM(1),IND+1)*IUNIT(IPARM(1),IND+6)) GO TO 5
C**** SET RELOAD FLAG
      IRESFL=1
      GO TO 5
C**** IF RELOAD IS NOT REQUIRED GO TO 5; ELSE SET RELOAD FLAG=IRESFL
    4 IF(IUNIT(IPARM(1),IND+7) * IUNIT(IPARM(1),IND+1) .LE.
     Z  IUNIT(IPARM(1),IND+4))GO TO 5
C
C**** SCHEDULE RELOAD FLAG
      IRESFL = 1
    5 CONTINUE
      IF(IRESFL .EQ. 1) CALL SCHED(2, IPARM, TIME)
C**** HARD-WIRED DATA TO HANDLE STINGER
C**** AMMO TYPE 15,MIX 11,24,OR26 MORTA
      IF(MIX.NE.11) GO TO 10
      IF(MIX.NE.24) GO TO 10
      IF(MIX.NE.26) GO TO 10
C**** ADD AMMO TO THE STINGER WEAPONS
      IUNIT(IPARM(1),60)=IUNIT(IPARM(1),60)+9
   10 CONTINUE
      RETURN
      END
```

u. SUBROUTINE: UNTDEP

PURPOSE: Processes a truck departing a unit subsequent to being emptied in a reload event.

COMMON BLOCKS: LOG

CALLS: INTRDK
OPERA
SCHED

IS CALLED BY: ARM Driver

```
CALLING PARAMETERS:  IPARM (5) - (1) -- Unit Number
                                 (2) -- Truck Number
```

LOCAL ARRAYS: None.

FUNCTIONS:

Determines ammunition mix required by the truck.

Routes truck to ATP or ASP as is appropriate from the ammunition mix.

Consider truck failures and interdiction in the computation of the travel time.

```
      SUBROUTINE UNTDEP (IPARM)
C**** EVENT UNTDEP --  DEPARTURE OF TRUCK FROM UNIT.
C
C**** J. FOX     JAN 79
C
C**** IPARM(1) -- UNIT NUMBER
C**** IPARM(2) -- TRUCK NUMBER
C
C**** SCHEDULES     --  ATPARV, ARRIVAL OF TRUCK AT ATP  OR
C                   --  ASPARV, ARRIVAL OF TRUCK AT ASP
C
C**** CHECKS        --  DELAY IN ARRIVAL TIME AT ATP OR ASP DUE
C                       TO MTBF AND INTERDICTION.
C
C**** CHANGES       --  UNIT TRUCK QUEUE
C
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSTME(20,3), IATPSD(5), TDAY, TIME,
     $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
      DIMENSION IPARM(5)
C
C**** LOCAL VARIABLES
C**** MIX IS THE AMMO MIX INDEX
C**** DIST = DISTANCE TO ATP OR ASP
C**** ITKTYP = TRUCK TYPE
C**** TRTM = ROAD TRAVEL TIME
C**** IASPFG = LOCAL FLAG  = 1 IF GOING TO ASP
C****                      = 2 IF GOING TO ATP
C**** ILOW - COPMUTED FROM LPPAR = FIRST NON ATP AMMO CODE
C**** JLOOP - FROM LPPAR, DO LOOP TOP FOR NUM OF AMMO CODES
C**** TFAIL - TIME LOST DUE TO REMEDIAL MAINTENANCE
C**** TMIND = TIME DELAY DUE TO INTERDICTION
C**** TOTTIM = TIME OF ARRIVAL AT ATP OR ASP
      ILOW = LPPAR(2) + 1
C
```

```
C**** DETERMINE AMMO MIX INDEX
      MIX = ITRUCK(IPARM(2), 5)
C
C**** IF MIX CONTAINS AMMO OTHEF THAN THAT AT ATP (1-5) GO TO ASP
      JLOOP = LPPAR(1)
      DO 5 I = ILOW,JLOOP
      IF(IMIX(MIX, I) .GT. 0) GO TO 10
    5 CONTINUE
C
C**** TRUCK BOUND FOR ATP.  LOOK UP LISTANCE TO ATP  (DIST)
      DIST = IUNIT(IPARM(1), 4)
      IASPFG = 2
      GO TO 15
C
C**** TRUCK BOUND FOR ASP.  LOOK UP CISTANCE TO ASP  (DIST)
   10 DIST = IUNIT (IPARM(1), 5)
      IASPFG = 1
C
C**** DETERMINE TRUCK TYPE (ITKTYP)
   15 ITKTYP = ITRUCK(IPARM(2), 1)
C
```

```
JTINE UNTDEP      73/73    OPT=1                          FTN 4.6+460          04/17/8
```

```
C**** DETERMINE ROAD TRAVEL TIME
      TRTM = 60 * DIST / ITYPE(ITKTYP,IDAY+1)
C**** UPDATE TRUCK STATUS CODE
      ITRUCK(IPARM(2),3) = 4
C
C**** COMPUTE DELAY DUE TO FAILURE (TFAIL)
      CALL OPEPA (IPARM(2), TRTM, TFAIL)
```

```
C
C**** COMPUTE DELAY DUE TO INTERDICTION (TMIND)
      CALL INTRDK (IPARM(2), TMIND)
C
C**** COMPUTE TIME OF ARRIVAL
      TOTTIM = TIME + TMIND + TFAIL + TRTM
      IF(IASPFG .EQ. 2)GO TO 25
C
C**** SCHEDULE ASP ARRIVAL.
      IPARM(3) = IUNIT(IPARM(1),3)
      CALL SCHED (5, IPARM, TOTTIM)
      GO TO 30
C
C**** SCHEDULE ATP ARRIVAL.
   25 IPARM(3) = IUNIT(IPARM(1),2)
      CALL SCHED (4, IPARM, TOTTIM)
C
   30 RETURN
C
      END
```

v. SUBROUTINE: CREEVT

PURPOSE: Enables interactive creation of events to occur later in the processing cycle.

COMMON BLOCKS: LOG

CALLS: READF
SCHED

IS CALLED BY: Control

CALLING PARAMETERS: None.

LOCAL ARRAYS: None.

FUNCTIONS:

Displays instructions to the operator as to the procedures in creating an event.

Accepts parameters for an event from the operator and schedules the event.

```
      SUBROUTINE CREEVT
C**** ENABLES INTERACTIVE CREATION OF EVENTS SUCH AS TRUCKS
C**** TO ARRIVE AT AN ATP FROM THE CSA IN MID-CI.
C**** JAMES FOX ESQ. DOT. TNT. MARCH NINETEEN HUNDRED AND SEVENTY NINE
C**** LOCAL VARIABLE DEFINITION
C**** IPARM - CONTAINS THE 5 PARAMETEPS OF THE EVENT
C**** INTGR -  "     "  UP TO 6 INTEGER VALUES FROM THE CONSULE
C**** IWORD -  "     "  UP TO 6 ALPHA VALUES FROM THE CONSULE
C**** REAL  -  "     "  UP TO 6 REAL VALUES FROM THE CONSULE
C**** IEND  -  "     "  END OF INPUT CHECK
C**** TOTTIM - TIME OF SCHEDULED EVENT
C**** ITYP - EVENT TYPE
      DIMENSION IPARM(5),INTGR(6),IWORD(6),REAL(6)
      DATA IHELP /"HELP"/
      DATA IEND /"END"/
    5 WRITE(2,100)
      LU1=1
   10 WRITE(2,150)
  150 FORMAT(/,1X," ?  ")
      CALL READF(LU1,6,INTGR,PEAL,IWORD)
C**** IF END OF INPUT RETURN (200)
      IF(IWORD(1).EQ.IEND) GO TO 200
      IF(IWORD(1).EQ.IHELP) GO TO 5
```

```
C**** LOAD EVENT TYPF, PARAMETERS, AND TIME
      ITYP=INTGR(1)
      IF(ITYP.LE.0.OR.ITYP.GT.17) GO TO 10
      DO 20 I=1,5
      IPARM(I)=INTGR(I+1)
   20 CONTINUE
      TOTTIM=REAL(1)
      CALL SCHED(ITYP,IPARM,TOTTIM)
      GO TO 10
  100 FORMAT(" TO CREATE AN EVENT, INPUT AS A GROUP SEPARATED BY",/,
     Z     " COMMAS OR SPACES THE FOLLOWING 7 VALUES ",/,
     Z     " EVENT TYPE (INTEGER VALUES BETWEFN 1 AND 17),",/,
     Z     " 5 PARAMETERS FOR EACH EVENT(INTEGEP,DFPEND ON EVENT TYPE",/,
     Z     " AND TIME (DECIMAL MINUTES, REAL).",/,
     Z     " EXAMPLE: 10,1,512,0,0,0,305.",/,
     Z     " CSA-TO-ATP TRUCK 512 WILL ARRIVE AT ATP AT TIME = 305 MIN"/)
  200 RETURN
      END
```

w. SUBROUTINE: EDIT

PURPOSE: Enables the listing and/or modification of the data stored in the block COMMON LOG.

COMMON BLOCKS: LOG

CALLS: READF

IS CALLED BY: CONTRL

CALLING PARAMETERS: None.

LOCAL ARRAYS:

INTGR(10) -- Storage for up to 10 integer number fields input from the console.

REAL(10) -- Storage for up to 10 real number fields input from the console.

IWORD(10) -- Storage for up to 10 alpha numeric fields input from the console.

NAME(19) -- Storage for the names of the 19 arrays and variables in COMMON LOG.

LIMIT1(19) -- Storage for the upper limit on the first index of the arrays and variables in COMMON LOG.

LIMIT2(19) -- Storage for the upper limit on the second index of the arrays and variables in COMMON LOG.

FUNCTIONS:

Displays to the operator a message requesting input as to what array or variable in COMMON LOG is of interest.

Accepts from the operator the message as to which array.

Operator then inputs whether he wishes to list or change the array.

Program branches to the proper logic and lists or updates.
An input of "END" exits the logic.

```
      SUBROUTINE EDIT
C**** ALLOWS EDITING OF DATA IN COMMON LOG
C**** H. JONES     FEB 79
C**** NOTE ALL VARIABLES IN COMMON LOG ARE 2 DIMENSIONAL
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(1,9),
     Z  IRSTME(20,3), IATPSD(1,5),
     $  IDAY(1,1), TIME(1,1), ICSA(1,20), LPPAR(1,5),
     Z  IASPAM(4,20), LUOUT(1,1), TCIST(1,1), TCILNG(1,1), LOOK(1,17)
      DIMENSION   INTGR(10), REAL(10), IWORD(10)
C
      DIMENSION NAME(18), LIMIT1(18), LIMIT2(18)
      DATA NAME /"IATP", "IASP", "IUNIT", "ITRUCK", "ITYPE",
     Z  "IMIX", "INTER", "IRSTME", "IATPSD", "IDAY",
     Z   "TIME", "ICSA",  "LPPAR",  "IASPAM", "LUOUT", "TCIST",
     $  "TCILNG", "LOOK"/
C
      DATA LIMIT1 /4, 4, 75, 560, 6,
     Z   40, 1, 20, 1, 1,
     Z    1, 1,  1, 4, 1, 1, 1, 17/
C
      DATA LIMIT2 /30, 41, 69, 7, 6,
     Z   23, 9, 3, 5, 1,
     Z    1, 20, 5, 20, 1, 1, 1, 1/
      DATA IEND/"END"/
      NNAMES = 18
C
   10 WRITE(2,100)
      LU1 = 1
      CALL READF (LU1, 10, INTGR, REAL, IWORD)
C
C**** BRANCH ON DATA TYPE
   15 IF(IWORD(1) .EQ. IEND) GO TO 95
      DO 20 KTYPE = 1,NNAMES
      IF(IWORD(1) .EQ. NAME(KTYPE)) GO TO 30
   20 CONTINUE
      GO TO 10
```

```
C**** SET LIMITS FOR DATA TYPE
   30 ILOW = INTGR(1)
      IHIGH = INTGR(2)
      IFLG = 0
      IF(ILOW .EQ. 0 .AND. IHIGH .EQ. 0) IFLG = 1
      IF(IFLG .EQ. 1) ILOW = 1
      IF(IFLG .EQ. 1) IHIGH = LIMIT1(KTYPE)
      IF(IHIGH .EQ. 0) IHIGH = ILOW
      IF(IHIGH .GT. LIMIT1(KTYPE))  IHIGH = LIMIT1(KTYPE)
      IF(ILOW .GT. LIMIT1(KTYPE)) GO TO 10
C
C**** BACKGROUND HAS BEEN SET, READ CHANGE OR LIST COMMAND
   40 WRITE(2,120)
      CALL READF (LU1, 10, INTGR, REAL, IWORD)
      IF(IWORD(1) .EQ. "LIST" .OR. IWORD(1) .EQ. "L") GO TO 50
      IF(IWORD(1) .EQ. "CHANGE" .OR. IWORD(1) .EQ. "C") GO TO 80
      GO TO 15
C
C**** LIST COMMAND
```

TINE EDIT   73/73   OPT=1   FTN 4.6+460   04/17

```
   50 IATT1 = INTGR(1)
      IATT2 = INTGR(2)
      IFLG = 0
      IF(IATT1 .EQ. 0 .AND. IATT2 .EQ. 0) IFLG = 1
      IF(IFLG .EQ. 1) IATT1 = 1
      IF(IFLG .EQ. 1) IATT2 = LIMIT2(KTYPE)
      IF(IATT2 .EQ. 0) IATT2 = IATT1
      IF(IATT2 .GT. LIMIT2(KTYPE))  IATT2 = LIMIT2(KTYPE)
      IF(IATT1 .GT. LIMIT2(KTYPE)) GO TO 40
      DO 70 INDEX = ILOW, IHIGH
      WRITE(2,140) NAME(KTYPE), INDEX
      DO 70 IATT = IATT1, IATT2
      IF(KTYPE .EQ. 1) IVALUE = IATP(INDEX, IATT)
      IF(KTYPE .EQ. 2) IVALUE = IASP(INDEX, IATT)
      IF(KTYPE .EQ. 3) IVALUE = IUNIT(INDEX, IATT)
      IF(KTYPE .EQ. 4) IVALUE = ITRUCK(INDEX, IATT)
      IF(KTYPE .EQ. 5) IVALUE = ITYPE(INDEX, IATT)
      IF(KTYPE .EQ. 6) IVALUE = IMIX(INDEX, IATT)
      IF(KTYPE .EQ. 7) IVALUE = INTER(INDEX, IATT)
      IF(KTYPE .EQ. 8) IVALUE = IRSTME(INDEX, IATT)
      IF(KTYPE .EQ. 9) IVALUE = IATPSD(INDEX, IATT)
      IF(KTYPE .EQ. 10) IVALUE = IDAY(INDEX, IATT)
      IF(KTYPE .EQ. 11) IVALUE = TIME(INDEX, IATT)
      IF(KTYPE .EQ. 12) IVALUE = ICSA(INDEX, IATT)
      IF(KTYPE .EQ. 13) IVALUE = LPPAR(INDEX, IATT)
      IF(KTYPE .EQ. 14) IVALUE = IASPAM(INDEX, IATT)
      IF(KTYPE .EQ. 15) IVALUE = LUOUT(INDEX, IATT)
      IF(KTYPE .EQ. 16) IVALUE = TCIST(INDEX, IATT)
      IF(KTYPE .EQ. 17) IVALUE = TCILNG(INDEX, IATT)
      IF(KTYPE .EQ. 18) IVALUE = LOOK(INDEX, IATT)
C
      IF(KTYPE .NE. 3) GO TO 60
      IF(IATT .NE. 6  .AND. IATT .NE. 7) GO TO 60
      WRITE(2,160) IATT, IVALUE
      GO TO 70
C
   60 WRITE(2,150) IATT, IVALUE
   70 CONTINUE
      GO TO 40
C
C**** CHANGE COMMAND
   80 IATT = INTGR(1)
      VALUE = INTGR(2) + RFAL(1)
      IF(IATT .GT. LIMIT2(KTYPE)) GO TO 40
C
```

```
C
      DO 90 INDEX = ILOW, IHIGH
C     INSERT VALUE IN PROPER ARRAY
      IF(KTYPE .EQ. 1) IATP(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 2) IASP(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 3) IUNIT(INDEX, IATT) = VALUE
      IF(KTYPE.EQ.3.AND.(IATT.EQ.6.OR.IATT.EQ.7))
     Z IUNIT(INDEX,IATT)=IWORD(2)
      IF(KTYPE .EQ. 4) ITRUCK(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 5) ITYPE(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 6) IMIX(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 7) INTER(INDEX, IATT) = VALUE


      IF(KTYPE .EQ. 8) IRSTME(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 9) IATPSD(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 10) IDAY(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 11) TIME(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 12) ICSA(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 13) LPPAR(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 14) IASPAM(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 15) LUOUT(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 16) TCIST(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 17) TCILNG(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 18) LOOK(INDEX, IATT) = VALUE
C
   90 CONTINUE
      GO TO 40
C
   95 RETURN
  100 FORMAT(1X,"VARIABLE NAME = ")
  120 FORMAT(1X,"..")
  140 FORMAT(/,1X,A10,I5)
  150 FORMAT(1X,"ATTRIBUTE ",I4," = ",I7)
  160 FORMAT(1X,"ATTRIBUTE ",I4," = ",A10)
      END
```

x. SUBROUTINE: EVINIT

PURPOSE: Reads a checkpoint/restart file for mass storage assigned as T2.

COMMON BLOCKS: EVENTS

CALLS: QINIT

IS CALLED BY: ARM Driver

CALLING PARAMETERS: None.

LOCAL ARRAYS: None.

FUNCTIONS:

Reads file containing unused events from previous ARM run.

Asks if operator wants to retain these events.

If operator answers "N" or "NO", calls QINIT to set all pointers to zero events.

```
      SUBROUTINE EVINIT
C**** READS EVENT FILE
C**** H. JONES     FEB 79
      COMMON/EVENTS/JSTAT(6),JEVOS(1024,4), IEVS(5,1024)
      READ(7)  JSTAT, JEVOS, IEVS
C
C**** ERASE OLD EVENTS ?
      WRITE(2,10)
   10 FORMAT (" RETAIN EVENTS CURRENTLY SCHEDULED ?  (YES/NO) ")
      READ(1,20) IANS
   20 FORMAT(A10)
      IF(IANS .EQ. "NO" .OR. IANS .EQ. "N") CALL QINIT
      RETURN
      END
```

y. SUBROUTINE: EVSTOP

PURPOSE: Writes event files to mass storage (Unit 7) tape2 for checkpoint/restart.

COMMON BLOCKS: EVENT

CALLS: None.

IS CALLED BY: ARM Driver

CALLING PARAMETERS: None.

LOCAL ARRAYS: None.

FUNCTIONS:

Writes all of event file to mass storage to enable checkpoint/restart.

```
      SUBROUTINE EVSTOP
C**** WRITES EVENT FILE
C**** H. JONES    FEB 79
      COMMON/EVENTS/JSTAT(6),JEVDS(1024,4), IEVS(5,1024)
      WRITE(8)  JSTAT, JEVDS, IEVS
      RETURN
      END
```

z. SUBROUTINE: FINTK

PURPOSE: Finds the truck in the queue (passed parameter) with the proper ammunition code (passed parameter) and the smaller percent load of ammunition.

COMMON BLOCKS: LOG

CALLS: GETQUE
PUTQUE

IS CALLED BY: ATP
LDPWDR
RELOAD

CALLING PARAMETERS: NQUE -- Number of the queue to be searched.
NRND -- Round type required.
NTRUCK -- Number of truck found in NQUE, equal zero if no truck found in queue.

LOCAL ARRAYS: None.

FUNCTIONS:

Pull the first truck from the queue and save it, and put it back in the queue.

Search through the trucks in the queue, saving the one with the proper ammunition type and the smallest percentage load.

When you pull the check truck from the queue, the search is complete since the queues are first in first out (FIFO).

```
      SUBROUTINE FINTK (NQUE, NRND, NTRUCK)
C**** DETERMINES NUMBER OF TRUCK (NTRUCK) IN QUEUE (NQUE) HAS
C**** THE SMALLEST PERCENTAGE LOAD OF ROUNDS OF TYPE (NRND)
C**** JIM FOX        JAN 79
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSIME(20,3), IATPSD(5), IDAY, TIME,
     $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
C
C**** LOCAL VARIABLES:
C**** NTKSAV -- SAVES TRUCK NUMBER WITH THE SMALLEST LOAD
C**** NPERSV -- SMALLEST PERCENT FOUND
C**** ITRCK -- TRUCK FROM QUEUE
C**** NCHTK -- END OF QUEUE CHECK
C**** MIX   -- AMMO MIX INDEX
C
C**** INITIALIZE AMMO PERCENT
      NPERSV = 110
C
C**** ASSUME NO TRUCK WITH PROPER AMMO
      NTRUCK = 0
C
C**** BRING FIRST TRUCK FROM QUEUE (ITRCK)
      CALL GETQUE (ITRCK, NQUE)
C
C**** IF QUEUE IS EMPTY RETURN
      IF(ITRCK .EQ. 0) RETURN
C
C**** THERE ARE SOME TRUCKS IN QUEUE
C**** SEARCH FOR RIGHT TRUCK, STORE NCHTK AND PUT IT BACK IN QUEUE
      NCHTK = ITRCK
      CALL PUTQUE(ITRCK, NQUE)
C
C**** PULL TRUCK FROM QUEUE
   25 CALL GETQUE(ITRCK,NQUE)
```

```
C**** DETERMINE AMMO MIX TYPE
      MIX = ITRUCK(ITRCK, 5)
C
C     CHECK TO SEE THAT THE TRUCK HAS A VALID MIX
      IF(MIX .GT. 0)GO TO 10
      WRITE(LUOUT,250)ITRCK
  250 FORMAT(1X,"  FINTK- NONPOSITIVE MIX FOR TRUCK ",I5)
      GO TO 30
C**** IF RIGHT AMMO COMPARE LOAD SIZE; IF NOT GO TO CHECK END QUEUE
   10 IF(IMIX(MIX, NKND) .GT. 0) GO TO 20
C
C**** WRONG TRUCK, PUT BACK IN QUEUE
   15 CALL PUTQUE(ITRCK,NQUE)
C
C**** IF LAST TRUCK, RETURN
   30 IF(ITRCK .EQ. NCHTK) RETURN
      GO TO 25
C
C**** HAVE FOUND CORRECT AMMO CHECK TO SEE IF SHOULD BE SAVED
   20 IF(ITRUCK(ITRCK,6) .GT. NPERSV) GO TO 15
      IF(NTRUCK .NE. 0) CALL PUTQUE(NTRUCK, NQUE)
```

```
      NPERSV = ITRUCK(ITRCK,6)
      NTRUCK = ITRCK
      IF(NTRUCK .NE. NCHTK) GO TO 25
      RETURN
      END
```

aa. SUBROUTINE: GETQUE

PURPOSE: Removes the first truck from its queue.

COMMON BLOCKS: QUENUM
QUEPNT

CALLS: None.

IS CALLED BY: ASP
ATP
FINTK
TRKPUT

CALLING PARAMETERS: ITEM -- Truck number removed from the queue, zero if queue is empty.
NUMQUE -- Number of queue to be accessed.

LOCAL ARRAYS: None.

FUNCTIONS:

Removes lead truck from the queue.

Updates the queue printer tables.

```
      SUBROUTINE GETQUE (ITEM, NUMQUE)
C**** GETS ITEM FROM QUEUE NUMQUE
C**** TO GET TRUCK FROM QUEUE 4 -- CALL GETQUE (N,4)
C**** H. JONES     DEC 78
      COMMON /QUENUM/ NHEAD(136)
      COMMON /QUEPNT/ IPNT(560)
      ITEM = 0
      LITEM = 0
      IPOINT = NHEAD(NUMQUE)
C
   10 IF(IPOINT .EQ. 0) GO TO 20
      LITEM = ITEM
      ITEM = IPOINT
      IPOINT = IPNT(ITEM)
      GO TO 10
   20 IF(LITEM .GT. 0)  IPNT(LITEM) = 0
      IF(LITEM .EQ. 0) NHEAD(NUMQUE) = 0
C
      RETURN
      END
```

bb. SUBROUTINE: INIT

PURPOSE: Reads data base from T1 into the LOG and queue COMMONS.

COMMON BLOCKS: LOG
QUENUM
QUEPNT

CALLS: CONTRL
RDJIFF
SCHED
TRKTIM

IS CALLED BY: ARM Driver

CALLING PARAMETERS: None.

LOCAL ARRAYS: None.

FUNCTIONS:

Reads data base into COMMONS LOG, QUENUM, QUEPNT.

Displays message requesting the planned battle time to stop the simulation.

Accepts operator input as to time to stop the simulation and schedule stop event.

Calls TRKTIM, CONTRL, RDJIFF to complete run initialization.

```
      SUBROUTINE INIT
C**** INITIALIZES SIMULATION
C**** H. JONES    JAN 79
C
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,63),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSTME(20,3), IATPSD(5), IDAY, TIME,
     $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG,
      COMMON /QUENUM/ IHEAD(136)
      COMMON /QUEPNT/ ITEMS(560)
      DIMENSION IPARM(5)
      DATA LOOK /17*0/
C
C**** READ FILES WITH ALL COMMON DATA
      READ(3) IATP,IASP,IUNIT,ITRUCK,ITYPE,IMIX,INTER,IRSTME,
     Z  IATPSD,IDAY,TIME,ICSA,LPPAR,IASPAM,LUOUT,TCIST,
     Z  TCILNG, IHEAD, ITEMS
C
C     IF BUILDING ANSWER FILES BYPASS STEPS
      WRITE(2,20)
   20 FORMAT("  ARE YOUR CREATING AN ANSWER FILE(Y OR N)")
      READ(1,21)IANS
   21 FORMAT(A10)
      IF(IANS.EQ."Y" .OR. IANS .EQ. "YES")GO TO 10
C
      WRITE(2,22)
   22 FORMAT(" ENTER TIME TO STOP SIMULATION   ")
      READ(1,*) TSTOP
      IPARM(1) = "SCHEDULED "
      IPARM(2) =            " STOP"
      IPARM(3) = " "
      IPARM(4) = " "
      CALL SCHED (17, IPARM, TSTOP)
C
      CALL TEKTIM
   10 CALL CONTRL (TIME)
      TIME = TCIST
      IF(IANS .EQ."Y" .OR. IANS .EQ."YES")RETURN
C
C**** READ FILE FOR DEMANDS
      CALL ROJIFF
      RETURN
      END
```

cc. SUBROUTINE: INTRDK

PURPOSE: Determines if truck is interdicted while en route.

COMMON BLOCKS: LOG

CALLS: None.

IS CALLED BY: ASP
ASPARV
ATP
ATPARV
CSAARV
RELOAD
UNTDEP
LDPWDR

CALLING PARAMETERS: NUMTK -- The number of the truck to be considered.
TLOST -- = 0 if no interdiction, = time lost if interdiction occurs.

LOCAL ARRAYS: None.

FUNCTIONS:

Determines if truck is in zone 1 (mostly artillery interdiction), or zone 2 (mostly Air Force interdiction).

Increments the accumulator of the number of trucks that have been en route in zone 1 or zone 2.

Determine if truck is interdicted.

If yes, assess the time lost to system for truck replacement.

```
      SUBROUTINE INTROK(NUMTK,TLOST)
C
C**** DETERMINES IF A TRUCK ABOUT TO TRAVEL A ROUTE
C**** WILL BE INTERDICTED ALONG THAT ROUTE AND ASSESSES
C**** TIME DELAY FOR A REPLACEMENT TRUCK
C**** TWO DEPTH ZONES ARF CONSIDERED
C
C**** J. FOX     JAN 79
C
C****   ZONE 1  ALL UNIT TRUCKS SAVE THOSE DIVERTED FROM ATP TO ASP
C****   ALL OTHER REPLENISHMENT TRUCKS.
C
C**** NUMTK IS THE NUMBER OF THE TRUCK BEING CONSIDERED.
C**** TLOST  0 IF TRUCK IS NOT KILLED
C****          REPLACEMENT TIME IF THE TRUCK IS KILLED.
C
C**** SETS LOAD OF REPLACEMENT TRUCK TO 100 PER CENT
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSTME(20,3), IATPSD(5), IDAY,TIME,
     $  ICSA(20), LPFAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
C**** ASSUME TRUCK MADE IT OKAY
      TLOST = 0
C**** DETERMINE IF THE TRUCK IS IN ZONE 2. MISSION GT 1 STATUS = 5
C****  GO TO 15
      IF(ITRUCK(NUMTK,2) .GT. 1 .OR. ITRUCK(NUMTK,3) .EQ. 5)GO TO 15
C**** TRUCK IS TRAVELING THROUGH ZONE 1
C**** INCREMENT COUNTER OF TRUCKS HN ZONF 1
      INTER(8) = INTER(8) + 1
C**** IF SUFFICIENT NUMBER OF KILLS THIS CI RETURN
      IF(INTER(1) .GE. INTER(3))RETURN
C**** IF NOT EQUAL 0 MODULO INTER(7) DO NOT KILL,GO TO RETURN
      MODCK = INTER(8) / INTER(7) * INTER(7)
      IF(MODCK .NE. INTER(8))RETURN
      INTER(1) = INTER(1) + 1
      TLOST = INTER(5)
      ITRUCK(NUMTK,3) = 7
      WRITE(LUOUT,30) NUMTK,INTER(5)
 30   FORMAT(" HAVE KILLED ZONE 1 TRUCK ",I5," TIME LOST = ",I6)
      RETURN
C**** ZONE 2 TRUCK. INCREMENT COUNTER.
   15 INTER(9) = INTER(9) + 1
C**** IF SUFFICIENT ZONE TWO TRTCKS ALREADY KILLED GO TO RETURN
      IF(INTER(2) .GE. INTER(4))RETURN
C**** IF NOT ZERO MNDE INTER(7), DO NOT KILL
      MODCK = INTER(9) / INTER(7) * INTEP(7)
      IF(MODCK .NE. INTER(9))RETURN
C**** HAVE KILLED THIS TRUCK.  INCREMENT NUMBER KILLED
      ITRUCK(NUMTK,3)=7
      WRITE(LUOUT,20) NUMTK,INTER(6)
 20   FORMAT(" HAVE KILLED ZONE 2 TRUCK",I5," TIME LOST = ",I6)
      INTER(2) = INTER(2) +1
C**** SET TIME LOST.  ASSUME NOT A UNIT TRUCK.
      TLOST = INTER(6)
      IF(ITRUCK(NUMTK,2) .EQ. 1)TLOST = INTER(5)
      RETURN
      END
```

dd. SUBROUTINE: IQ

PURPOSE: To provide the queue number associated with the activity being processed.

COMMON BLOCKS: None

CALLS: None

IS CALLED BY: ATP
ATPAR1
ATPAR2
ATPARV
RELOAD
UNTARV
LDPWDR

CALLING PARAMETERS: ITYPE -- Type of queue being searched, varies from 1 to 10, see
page 11 for codes.
NUM -- Which member of type ITYPE.

LOCAL ARRAYS: None.

FUNCTIONS:

Check to see if queue type is valid.

Branches to proper calculation of queue number based on ITYPE.

```
      FUNCTION IQ(ITYPE, NUM)
C**** RETURNS QUEUE NUMBER
C**** JIM FOX         JAN 79
C**** LOCAL VARIABLES:
C**** ITYPE IS THE TYPE OF QUEUE TO BE CONSIDERED
C
C**** CHECK FOR VALID QUEUE NUMBER
      IF(ITYPE .GT. 0  .AND. ITYPE .LE. 10) GO TO 5
      WRITE (2,300)
      STOP
C
    5 GO TO (10,20,30,40,50,60,70,80,90,100), ITYPE
C
C**** UNIT QUEUE
   10 IQ = NUM
      GO TO 200
C
C**** ATP QUEUE FOR CSA-ATP TRUCKS
   20 IQ = 100 + NUM
      GO TO 200
C
C**** ATP QUEUE FOR ASP-ATP TRUCKS
   30 IQ = 104 + NUM
      GO TO 200
C
C**** ARTILLERY SERVER QUEUE AT THE ATP
   40 IQ = 108 + NUM
      GO TO 200
C
C**** MANEUVER SERVER QUEUE AT THE ATP
   50 IQ = 112 + NUM
      GO TO 200
C
C**** NOT USED
   60 CONTINUE
      GO TO 200
C**** ASP QUEUE FOR CSA-ASP TRUCKS
   70 IQ = 120 + NUM
      GO TO 200
C
C**** ROUTINE SERVER QUEUE AT THE ASP
   80 IQ = 124 + NUM
      GO TO 200
C
C**** GSRS SERVER QUEUE AT THE ASP
   90 IQ = 128 + NUM
      GO TO 200
C**** NOT USED
  100 CONTINUE
C
  200 RETURN
  300 FORMAT(" BAD QUEUE NUMBER IN FUNCTION IQ")
      END
```

ee. SUBROUTINE: LDPWDR

PURPOSE: Unloads the truck containing powder canisters (ammunition type 3) when 155 HE and ICM (ammunition codes 4 and 5) are removed from the ATP.

COMMON BLOCKS: LOG

CALLS: FINTK
INTRDK
IQ
OPERA
PUTQUE
SCHED

IS CALLED BY: ATP

CALLING PARAMETERS: NRNDS - Number of powder rounds needed.
IPARM (5) - (1) -- 1, indicates artillery.
(2) -- ATP number.

LOCAL ARRAYS: IIPARM (5) -- Builds the parameters to schedule trucks back to the
ASP or CSA.

FUNCTIONS:

Sets the ammunition type equal to 3.

Checks the ASP-ATP queue for powder trucks.

If insufficient ammunition in the ASP-ATP queue, the CSA-ATP queue is checked.

Decrements powder ammunition files.

Schedules empty powder trucks to arrive at ASP (ASPAR 1).

```
      SUBROUTINE LDPWDR(NRNDS,IPARM)
C**** UNLOADS POWDER TRUCK WHEN ARTY AMMO TAKEN FROM ATP
C
C**** J. FOX     JAN 79
C
C**** NRNDS IS NUMBER OF POWDER CANISTERS NEEDED
C**** IPARM IS IDENTICAL TO ATP
C**** NOTHING IS RETURNED
C**** SCHEDULES -- ASPAR1  ARRIVAL OF ASP-ATP TRUCK AT ASP
C****           -- CSAARV  ARRIVAL OF CSA-ATP TRUCK AT CSA
      COMMON /LOG/ IATP(4,30),IASP(4,41),IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSTME(20,3), IATPSD(5), IDAY, TIME,
     $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
C
C**** LOCAL VARIABLE DEFINITION
C**** IIPRAM - PARAMETERS FOR SCHEDULING POWDER TRUCK REFILL
C**** MIX - NUMBER OF AMMO MIX ON TRUCK FOR COMMON IMIX
C**** NR - HARD WIRED AMMO CODE FOR POWDER CHARGES
C**** NRNTK - NUMBER OF POWDER CHARGES ON THE TRUCK
C**** NUMTK - POWDER TRUCK ID NUMBER
C**** MR - AMMO TYPE FOR POWDER
C**** NRDSAV - NUMBER OF CANISTERS STILL NEEDED
C**** NQUE - ASP-ATP QUEUE NUMBER
C**** NUMTK - POWDER AMMO TRUCK
C**** NALTQ -  CSA -ATP  QUEUE NUMBER
C**** NRNTK - NUMBER OF CANISTERS ON TRUCK
C**** DIST - ROAD DISTANCE TRUCK WILL TRAVEL
C**** ICOD - EVENT TYPE TO BE SCHEDULED
C**** ITKTYP - TYPE OF TRUCK
C**** TRTM - ROAD TRAVEL TIME
C**** TFAIL - TIME LOST DUE TO FAILURE
C**** TMIND - TIME LOST DUE TO INTERDICTION
C**** TIME - TIME OF SCHEDULED EVENT
      DIMENSION IPARM(5),IIPRAM(5)
      DO 1 I = 1,5
      IIPRAM(I) = 0
    1 CONTINUE
C**** SET AMMO TYPE AND NUMBER OF ROUNDS NEEDED
      NR = 3
      NRDSAV = NRNDS
C**** FIND TRUCK, SAVE QUEUE WE ARE WORKING IN
    5 NQUE = IQ(3,IPARM(2))
      NNQ = NQUE
      CALL FINTK(NNQ,NR,NUMTK)
C**** IF HAVE TRUCK GO TO 10, ELSE CHECK CSA QUEUE
      IF(NUMTK .GT. 0)GO TO 10
      NALTQ = IQ(2,IPARM(2))
      NNQ = NALTQ
      CALL FINTK(NNQ,NR,NUMTK)
C**** IF HAVE TRUCK GO TO 10, ELSE WRITE ERROR AND CALL CONTRL
      IF(NUMTK .GT. 0)GO TO 10
      WRITE(2,15)IPARM(2)
```

```
   15 FORMAT("  NO POWDER AT ATP ",  I2 )
      WRITE(LUOUT,30)IPARM(2)
   30 FORMAT("  NO POWDER AT ATP  ",I2)
      RETURN
C**** HAVE TRUCK.  IF INSUFFICIENT AMMO,GO TO 20
   10 MIX = ITRUCK(NUMTK,5)
      NRNTK = (IMIX(MIX,NR) * ITRUCK(NUMTK,6) +99) / 100
      IF(NRNTK .LT. NRDSAV)GO TO 20
C**** SUFFICIENT AMMO, OFFLOAD AND PUT BACK IN QUEUE
      ITRUCK(NUMTK,6) = (NRNTK - NRDSAV) * 100 / IMIX(MIX,NR)
      CALL PUTQUE (NUMTK, NNQ)
C**** DECREMENT AMMO ON HAND AND DEMAND
      IATP(IPARM(2),22)=IATP(IPARM(2),22)-NRNDS
      IATP(IPARM(2),23)=IATP(IPARM(2),23)-NRNDS
      RETURN
C**** INSUFFICIENT AMMO
   20 ITRUCK(NUMTK,6) = 0
C**** DECREMENT ROUNDS NEEDED
      NRDSAV = NRDSAV - NRNTK
C**** IF DESTINATION IS ASP GO TO 25
      IF(NNQ .EQ. NQUE)GO TO 25
C**** GOING TO CSA
      DIST = IATP(IPARM(2),1)
      ICOD = 9
      IIPRAM(3) = 1
      GO TO 27
   25 DIST = IATP(IPARM(2),2)
      ICOD = 12
      IIPRAM(3) = IATP(IPARM(2),6)
   27 IIPRAM(1) = IPARM(2)
      IIPRAM(2) = NUMTK
      ITKTYP = ITRUCK(NUMTK,1)
      TRTM = 60 * DIST / ITYPE(ITKTYP,IDAY+3)
      ITRUCK(NUMTK,3) = 4
      CALL OPERA(NUMTK,TRTM,TFAIL)
      CALL INTRDK(NUMTK,TMIND)
      TOTTIM = TIME + TRTM + TFAIL + TMIND
      CALL SCHED(ICOD,IIPRAM,TOTTIM)
C**** GO GET ANOTHER TRUCK
      GO TO 5
      END
```

ff. SUBROUTINE: LOOKEV

PURPOSE: Enables selective monitoring of event generation and processing.
COMMON BLOCKS: LOG

CALLS: None.

IS CALLED BY: ARM Driver
SCHED

CALLING PARAMETERS: KIND -- Event code (range of values 1-17)
IPARM (5) -- Event parameters
TLTIME -- Time of scheduled event
IGET -- 1 if event is being processed, = 0 if event
is being
scheduled.

LOCAL ARRAYS: NAME(17) -- Contains the alphanumeric names of subroutines processing the event types and is used for display purposes.

FUNCTIONS:

Determines from the LOOK array if the type event being handled is to be displayed.

Display event data, if applicable.

```
      SUBROUTINE LOOKEV (KIND, IPARM, TLTIME, IGET)
C**** PROVIDES MONITORING OF EVENTS (DEPENDENT ON LOOK(17))
C**** H. JONES      MAR 79
      DIMENSION IPARM(5), NAME(17)
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     $  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     $  IRSTME(20,3), IATPSD(5), IDAY, TIME,
     $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
      DATA NAME /"DEMAND", "RELOAD", "UNTDEP", "ATPARV", "ASPARV",
     $  "ATP   ", "ASP   ", "UNTARV", "CSAARV", "ATPAR1", "ATPAR2",
     $  "ASPAR1", "HELARV", "HASPAR", "REPORT", "CONTRL", "ENDSIM"/
C
      IF(LOOK(KIND) .EQ. 0) GO TO 20
      N = NAME(KIND)
      IF(IGET .EQ. 1) WRITE(LUOUT,10) N, IPARM, TLTIME
   10 FORMAT(1X,A10,", PARMS = ",5I6,", TIME= ",F8.1)
      IF(IGET .EQ. 0) WRITE(LUOUT,18) N, IPARM, TLTIME
   18 FORMAT(1X,A10,", PARMS = ",5I6,", SCHED TIME= ",F8.1)
   20 RETURN
      END
```

gg. SUBROUTINE: NXTQUE

PURPOSE: Displays the first truck in the queue without changing the queue sequence.

COMMON BLOCKS: QUENUM, QUEPNT

CALLS: None.

IS CALLED BY: CONTRL
TRKPUT

CALLING PARAMETERS: ITEM -- Number of the first truck in the queue.
NUMQUE -- Number of the queue to be examined.

LOCAL ARRAYS: None.

FUNCTIONS:
Determines the number of the first truck in queue NUMQUE.

```
      SUBROUTINE NXTQUE (ITEM, NUMQUE)
C**** SHOWS NEXT ITEM IN QUEUE (LEAVES IT IN)
C**** H. JONES    FEB 79
      COMMON /QUENUM/ NHEAD(136)
      COMMON /QUEPNT/ IPNT(560)
      ITEM = 0
      IPOINT = NHEAD(NUMQUE)
C
   10 IF(IPOINT .EQ. 0) GO TO 20
      ITEM = IPOINT
      IPOINT = IPNT(ITEM)
      GO TO 10
C
   20 RETURN
      END
```

hh. SUBROUTINE: OPERA

PURPOSE: Determines if reliability failure exists and assesses the resultant time lost.

COMMON BLOCKS: LOG

CALLS: None.

IS CALLED BY: ASP
ASPARV
ATP
ATPARV
CSAARV
DEMAND
HELARV
UNTDEP
LDPWDR

CALLING PARAMETERS: KTRUCK -- Truck being considered.
TRTME -- Unopposed travel time for the next link of the route.
DELAY -- Time to repair the truck if failure occurs, zero otherwise.

LOCAL ARRAYS: None.

FUNCTIONS:

Determines truck type.

Determines mean time between failure for truck type.

Determines time until the next failure.

If time to next failure is less than the travel time assesses repair time, and resets the time since last failure clock.

```
      SUBROUTINE OPERA (KTRUCK, TRTIME, DELAY)
C**** CALCULATES DELAY DUE TO RELIABILITY FAILURE
C**** EACH TRUCK HAS CLOCK OF TIME SINCE LAST FAILURE.
C**** H. JONES       JAN 79
C
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSTME(20,3), IATPSD(5), IDAY, TIME,
     $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
C
C**** LOCAL VARIABLES
C**** DELAY - TIME LOST DUE TO REMEDIAL MAINTENANCE
C**** KTRUCK - TRUCK NUMBER
C**** KTYPE - TRUCK TYPE
C**** MTBF - MEAN TIME BETWEEN FAILURES FROM ITYPE
C**** REMAIN - TIME LEFT UNTIL NEXT FAILURE BEFORE THIS MOVE
C**** TLEFT - TIME LEFT UNTIL NEXT FAILURE AFTER THIS MOVE
C**** TRTIME - TIME LENGH OF THIS MOVE
C**** SET TIME LOST TO ZERO
      DELAY = 0.
C**** COMPARE TRUCKS REMAINING TIME BEFORE FAILURE WITH TRANSIT TIME.
      KTYPE = ITRUCK(KTRUCK, 1)
      MTBF = ITYPE(KTYPE, 5)
      REMAIN = MTBF - ITRUCK(KTRUCK, 7)
      TLEFT = REMAIN - TRTIME
      IF(TLEFT .GT. 0.) GO TO 10
```

```
C
C**** FAILURE OCCURS THIS TRANSIT
      DELAY = ITYPE(KTYPE, 6)
      ITRUCK(KTRUCK, 7) =  - TLEFT
C
C**** WRITE RECORD FOR LOST TRUCK
      WRITE(LUOUT,5) KTRUCK,TIME
 5    FORMAT(" TRUCK NUMBER",I5," FAILED AT ",F8.0)
      ITRUCK(KTRUCK,3) = 6
      GO TO 20
   10 ITRUCK(KTRUCK,7) = ITRUCK(KTRUCK,7) + TRTIME
   20 RETURN
      END
```

ii. SUBROUTINE: PUTQUE

PURPOSE: Places the truck in the queue by setting queue pointers.

COMMON BLOCKS: QUENUM
QUEPNT

CALLS: None.

IS CALLED BY: ASPAR1
UNTARV
FINTK
LDPWDR
TRKPUT

CALLING PARAMETERS: ITEM -- Truck to be placed in queue.
NUMQUE -- Queue number receiving truck.

LOCAL ARRAYS: None.

FUNCTIONS:

Places truck in queue by updating pointer tables.

```
      SUBROUTINE PUTQUE (ITEM, NUMQUE)
C**** PUTS ITEM IN QUEUE NUMQUE
C**** H. JONES     DEC 78
      COMMON /QUENUM/ NHEAD(136)
      COMMON /QUEPNT/ IPNT(560)
      IOLDH = NHEAD(NUMQUE)
      NHEAD(NUMQUE) = ITEM
      IPNT(ITEM) = IOLDH
      RETURN
      END
```

jj. SUBROUTINE: QINIT

PURPOSE: Initializes the event queue directory.

COMMON BLOCKS: EVENTS

CALLS: None.

IS CALLED BY: EVINIT

CALLING PARAMETERS: None.

LOCAL ARRAYS: JFORE (1024) -- Equivalenced to the first 1024 words of array JEVDS and contains the pointers to the previous events.

JBACK (1024) -- Equivalenced to the second 1024 words of array JEVDS and contains the pointers to the subsequent events.

JTIME (1024, 2) -- Equivalenced to the last 2048 words of array JEVDS and contains the time parameters of the events.

FUNCTIONS:

Sets number of event space available to max of 1024.

Zeroes first event position, last event position.

Sets pointer arrays so that empty event one points to empty event two etc.

Sets the pointer of empty 1 to 0.

Sets forward pointer of empty event 1024 to zero.

```
      SUBROUTINE QINIT
C
C THIS ROUTINE INITIALIZES THE EVENT QUEUE DIRECTORY /EVENTS/
C
C       BOB DAVISON
      COMMON/EVENTS/JSTAT(6),JEVDS(1024,4), IEVS(5,1024)
      DIMENSION JFORE(1024),JBACK(1024),JTIME(1024,2)
      EQUIVALENCE (JFORE(1),JEVDS(1,1)),(JBACK(1),JEVDS(1,2)),
     Z (JTIME(1,1),JEVDS(1,3)),(JFIRST,JSTAT(1)),(JLAST,JSTAT(2)),
     Z (JEMPTY,JSTAT(3)),(NUMEVT,JSTAT(4)),(NEMPTY,JSTAT(5)),
     4 (MAXEVT,JSTAT(6)),(JTIME(1,2),JEVDS(1,4))
      NUMEVT=0
      NEMPTY = 1024
      JFIRST=0
      JLAST=0
      JEMPTY=1
      DO 100 I=1,NEMPTY
      JFORE(I)=I+1
      JBACK(I)=I-1
      JTIME(I,1)=0
      JTIME(I,2)=0
  100 CONTINUE
      JFORE(NEMPTY)=0
      JBACK(1)=0
      RETURN
      END
```

kk. SUBROUTINE: RDIEXO

PURPOSE: Updates IUNIT array for ammunition requirements of this demand pulse.

COMMON BLOCKS: LOG

CALLS: SCHED

IS CALLED BY: DEMAND

CALLING PARAMETERS: NUNIT -- Unit Number

LOCAL ARRAYS: IPARM(5) -- Parameters to schedule the demand event.

FUNCTIONS:

Zero IPARM array.

Determine the number of demand pulses for the unit this run.

SCHED a demand event based on the number of demand pulse being greater than one.

Update number of weapons alive, number of weapons short ammunition and the total number of rounds short for each ammunition type.

```
      SUBROUTINE RDIEXO(NUNIT)
C
C     UPDATES IUNIT EACH PULSE OF A MULTI-DEMAND AND SCHED DEMAND
C
C     JIM FOX - FEB 1979
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSTME(20,3), IATPSD(5), IDAY, TIME,
     3  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
C
C     LOCAL VARIABLES
C     NUNIT - UNIT NUMBER
C     NCELLS - NUMBER OF DEMAND PULSES IN DEMAND UNIT RECORD
C     IFLIV - NEGATIVE OF NUMBER OF TUBES KILLED
C     TOTTIM - COMPUTED TIME FOR SCHEDULING AN EVENT
C
      DIMENSION IPARM(5)
      DO 5 I = 1,5
      IPARM(I) = 0
    5 CONTINUE
C     SET IPARM TO CALL TO SCHEDULE DEMAND
      IPARM(1) = NUNIT
C     FIND NUMBER OF DEMAND PULSE CELLS
      XCELLS = IUNIT(NUNIT,69)
      NCELLS = XCELLS
      IF(NCELLS.LE.1) GO TO 100
C     COMPUTE THE TIME OF THE NEXT DEMAND EVENT AND SCHEDULE IT.
      TOTTIM = TIME + TCILNG / XCELLS
      IF(TOTTIM .GT. TCIST + TCILNG)GO TO 100
      CALL SCHED(1,IPARM,TOTTIM)
  100 CONTINUE
      IF(NCELLS.LE.1) NCELLS=1
      IF(XCELLS.LE.1) XCELLS=1.
C     UPDATE IUNIT WITH A PART OF THE DEMAND DATA
      DO 20 I = 1,5
      IND = I * 12 - 4
C     IF NO DATA TO UPDATE GO TO 20
      IF(IUNIT(NUNIT,IND+10) .LE. 0)GO TO 20
C     COMPUTE WHICH PULSE THAT THIS UPDATE REPRESENTS
      NUMPL = (TIME - TCIST) / (TCILNG / XCELLS) + .5
      IF(NCELLS.LE.1) NUMPL=1
C     COMPUTE NEGATIVE SURVIVOR FACTOR
C     LOWER NUMBER OF SURVIVORS FOR THIS PULSE
C     COMPUTE THE NUMBER OF DEAD TO BE ASSESSED THIS PULSE - NMDEAD
      NMDEAD = (IUNIT(NUNIT,IND+9)+NUMPL-1) / NCELLS
C     COMPUTE NUMBER OF RNDS LOST WITH DEAD WPN
      NDEDRD=NMDEAD*IUNIT(NUNIT,IND+4)/IUNIT(NUNIT,IND+1)
C     IF NEG. ROUNDS ON HAND - NONE LOST.
      IF(IUNIT(NUNIT,IND+4) .LE. 0) NDEDRD = 0
      IUNIT(NUNIT,IND+1) = IUNIT(NUNIT,IND+1) - NMDEAD
      IF(IUNIT(NUNIT,IND+1).LT.0) IUNIT(NUNIT,IND+1)=0
C**** ASSUME SINGLE PULSE UNIT
      IUNIT(NUNIT,IND+2)=IUNIT(NUNIT,IND+10)
```

```
C**** CHECK FOR ARTY UNITS
      IF(IUNIT(NUNIT,1).GE.4.AND.IUNIT(NUNIT,1).LE.6) IUNIT(NUNIT,IND+2)
     Z = IUNIT(NUNIT,IND+1)
C     IF FARP, NUMBER  OF WEAPONS SHORT AMMO = NUM IN CELL
      IF(IUNIT(NUNIT,1) .EQ. 8)IUNIT(NUNIT,IND+2) = IUNIT(NUNIT,IND+2)
     Z    + (IUNIT(NUNIT,IND+10) + NUMPL - 1) / NCELLS
C     UPDATE A PORTION OF ROUNDS SHORT
C     COMPUTE THE NUMBER OF ROUNDS SHORT TO BE ASSESSED THIS PULSE-NMRD
      NMRD = (IUNIT(NUNIT,IND+11) + NUMPL - 1) / NCELLS
      IUNIT(NUNIT,IND+3)=IUNIT(NUNIT,IND+3)+NMRD-(IUNIT(NUNIT,IND+7)
     Z  *NMDEAD - NDEDRD)
C     COMPUTE AMMO ON HAND
      IUNIT(NUNIT,IND+4) = IUNIT(NUNIT,IND+4) - (NDEDRD + NMRD)
   20 CONTINUE
      RETURN
      END
```

11. SUBROUTINE: RDJIFF

PURPOSE: Reads output file created by the attrition model of ammunition usage and updates IUNIT for RDIEXO.

COMMON BLOCKS: LOG

CALLS: EOF
SCHED
DECODE

IS CALLED BY: INIT

CALLING PARAMETERS: None.

LOCAL ARRAYS:

IRDJF (64)	--	Array resulting from reading attrition model record and converting it for ARM usage.
IPARM (5)	--	Parameter list to schedule the demand events.
RDJF (64)	--	Array for temporary storage of attrition model record.

FUNCTIONS:

Reads attrition model-produced file record of 64 real words.

Copies words 2 through 64 into an integer array.

Decodes alphanumeric first word (unit name from attrition model) into the integer array.

Finds matching unit number and replaces unit name.

Updates IUNIT with ammunition usage data for use by subroutine RDIEXO.

Schedules the first demand pulse.

Determines the number of demand pulses and places in array IUNIT.

Branches to first function until records are processed.

```
      SUBROUTINE RDJIFF
C
C      READS OUTPUT FILE CREATED BY JIFFY.
C     TRANSLATES THE JIFFY IDS TO ARM NUMBERS
C     SCHEDULES A DEMAND EVENT FOR EACH UNIT FIRING AMMO.
C     UPDATES IUNIT FOR SINGLE PULSE DEMAND UNITS.
C
C     JIM FOX - FEB 1979
C
C     LOCAL VARIABLE DEFINITION
C     UNTMAP - JIFFY UNIT NAMES ASSOCIATED WITH ARM UNIT NUMBERS.
C     IRDJF - JIFFY CREATED INTERFACE RECORD 64 WORDS LONG PER RECORD
C       1 - JIFFY UNIT ID
C       2 - NUMBER OF AH IN CELL(AH ONLY
C       3 - ARM AMMO CODE
C       4 - NUMBER OF WEAPONS ALIVE
C       5 - NUMBER OF WEAPONS SHORT AMMO
C       6 - TOTAL NUMBER OF ROUNDS SHORT
C       7-11  ECT  REPEAT OF 2 - 6
C     LUIN1 - JIFFY PRODUCED INPUT FILE
C
C     IAUN - LOOP INDEX
C     IND1 - COMPUTED INDEX TO ACCESS IUNIT AMMO TYPE
C     IAMMO - AMMO TYPE FROM IUNIT
C     IJF - LOOP INDEX
C     IJFAM - COMPUTED INDEX TO ACCESS IRDJF FOR AMMO TYPE
C     IJAM - IRDJF AMMO TYPE
C     I - LOOP INDEX
C     III - LOOP INDEX
C     IIJ - LOOP INDEX
C     IJF - LOOP INDEX
C     IU - LOOP INDEX
C     IN - INDEX TO SEARCH FOR UNIT NAME
C     IN1 - MATCHED ARM UNIT NUMBER
C     IAUN - LOOP INDEX
C     IND1 - INDEX COMPUTED FROM IAUN TO ACCESS IUNIT FOR AMMO TYPE
C     IA LOOP INDEX
C     IAM - INDEX COMPUTED FROM IA TO SEARCH IRDJF
C     IAMM - AMMO TYPE FROM IRDJF
C     IJFAM - INDEX COMPUTED FROM IJF TO ACCESS IRDJF
C     IJAM - AMMO TYPE FROM IRDJF
C     IUA - COMPUTED INDEX FROM IU TO ACCESS IUNIT
C     IUAM - AMMO TYPE FROM IUNIT
C     NHELCL - ACCUMULATOR FOR NUMBER OF HELICOPTERS IN CELLS
C     NMDEAD - NUMBER OF AH LOST TO FARP
C     NNI - INDEX TO ACCESS IRDJF,2,7,12 ECT
C     NRNSH - ACCUMULATOR FOR NUMBER OF ROUNDS SHORT
C     NWPNAL - ACCUMULATOR FOR NUMBER OF AH RETURNING ALIVE
C     NWPNSH - ACCUMULATOR FOR NUMBER OF AH SHORT ROUNDS
C     NCELLS - NUMBER OF CELLS IN FARP RECORD
C     XCELL - REAL VARIABLE EQUAL TO NCELLS
C     DELTIM - TIME INTERVAL BETWEEN FARP CELL PROCESSING
```

```
C     III - LOOP INDEX
C     XII - REAL EQUAL TO III
C     IIL - COMPUTED INDEX TO FILL IEXOUT
C     IIJ - COMPUTED INDEX TO FIND IRDJF TO BUILD IEXOUT RECORD
C     TOTTIM - TIME TO SCHEDULE EVENT
C
       COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSTME(20,3), IATPSD(5), IDAY, TIME,
     $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
       DIMENSION IRDJF(64),IPARM(5),RDJF(64)
       DO 10 I =1,5
       IPARM(I) - 0
   10 CONTINUE
C**** ZERO LAST EVENT'S DEMAND
C**** LOOP FOR UNITS
       DO 2 I1 = 1,75
C**** LOOP FOR 5 AMMO'S
       DO 3 I2 = 1,5
C**** LOOP FOR THREE ELEMENTS
       DO 4 I3 = 1,3
C**** COMPUTE THE FUN INDEX
       I4 = 4 + I2 * 12 + I3
       IUNIT(I1,I4) = 0
    4 CONTINUE
    3 CONTINUE
    2 CONTINUE
C
      LUIN1 = 9
      REWIND LUIN1
C     READ RECORD FROM JIFFY PRODUCED FILE.
   20 READ(LUIN1)RDJF
C     IF END OF FILE LUIN1 GO TO WRAPUP (200)
      IF(EOF(LUIN1))200,15
C     HAVE A RECORD, CONVERT UNIT TO ARM NUMBER
C**** DECODE UNIT NAME AND COPY OTHER REALS TO INTEGER
  15  DO 5 I=2,64
      IRDJF(I)=RDJF(I)
  5   CONTINUE
      DECODE(10,1,RDJF(1)) IRDJF(1)
  1   FORMAT(A10)
      DO 16 IN = 1,75
      IF(IUNIT(IN,7) .EQ. IRDJF(1))GO TO 30
   16 CONTINUE
C     NO MATCH
      WRITE(LUOUT,60)IRDJF(1)
   60 FORMAT("  NO MATCH FOR JIFFY UNIT ",A10)
      GO TO 20
C     HAVE A MATCH REPLACE UNIT NAME WITH IN
   30 IRDJF(1) = IN
      IN1 = IN
      IPARM(1) = IN1
```

```
C     IF NOT SINGLE PULSE UNIT GO TO 100
      IF(IUNIT(IN1,69) .GT. 0)GO TO 100
C     HAVE A SINGLE PULSE UNIT, UPDATE IUNIT AND CALL SCHEDULE
C     FIND PROPER AMMO IN ARM UNIT (IUNIT)
   40 DO 80 IAUN = 1,5
      IND1 = 12 * IAUN - 4
      IAMMO = IUNIT(IN1,IND1)
      IF(IAMMO .EQ. 0)GO TO 80
      DO 79 IJF = 1,5
      IJFAM = IJF * 5 - 2
      IJAM = IRDJF(IJFAM)
C****
C****
C****
C     SCENARIO DEPENDENT CODE TO READ IN SECOND AMMO CODE 2
      IF(IJAM .EQ. 25 .AND. IAUN .EQ. 3)GO TO 45
C****
C****
      IF(IJAM.EQ.12) IRDJF(IJFAM + 3) = IRDJF(IJFAM + 3) * 90
      IF(IJAM .NE. IAMMO .OR. IJAM .EQ. 0)GO TO 79
C     HAVE EQUAL AMMO TYPES, UPDATE IUNIT WITH NEW DATA.
C**** UPDATE FOR DEMAND DATA IN UNIT STATUS REPORT
   45 IUNIT(IN1,IND1+9) = IUNIT(IN1,IND1+1) - IRDJF(IJFAM+1)
      IF(IUNIT(IN1,IND1+9) .LT. 0)IUNIT(IN1,IND1+9) = 0
      IUNIT(IN1,IND1+10) = IRDJF(IJFAM+2)
      IUNIT(IN1,IND1+11) = IRDJF(IJFAM+3)
      IRDJF(IJFAM) = 0
C     END OF IUNIT UPDATE FOR THIS AMMO TYPE
      GO TO 80
   79 CONTINUE
C      NO UNIT AMMO MATCH
      WRITE(LUOUT,78) IN1,IJAM
   78 FORMAT("  NO AMMO MATCH IN IUNIT.  UNIT ",I5," AMMO",I5)
   80 CONTINUE
C     SCHEDULE DEMAND
      TOTTIM  =  TCIST + .5 * TCILNG
      CALL SCHED(1,IPARM,TOTTIM)
      GO TO 20
C     HAVE A MULTIPLUSE UNIT.  IF ARTY GO TO 120
  100 IF(IUNIT(IN1,1) .GT. 3 .AND.IUNIT(IN1,1) .LT. 7)GO TO 120
C     HAVE A FARP COUNT THE CELLS
      NCELLS = 0
      NHELCL = 0
      NWPNAL = 0
      NWPNSH = 0
      NRNSH = 0
C
      DO 102 I = 1,10
      NNI = 5 * I - 3
      IF(IRDJF(NNI) .LE. 0)GO TO 102
      NCELLS = NCELLS + 1
      NHELCL = NHELCL + IRDJF(NNI)
      NWPNAL = NWPNAL + IRDJF(NNI+2)
      NWPNSH = NWPNSH + IRDJF(NNI+3)
      NRNSH = NRNSH + IRDJF(NNI+4)
  102 CONTINUE
C     IF NO CELLS, GO TO THE NEXT UNIT RECORD
      IF(NCELLS .LE. 0)GO TO 20
      XCELL = NCELLS
C     COMPUTE TIME BETWEEN DEMAND PULSES
      DELTIM = TCILNG / XCELL
C     UPDATE NUMBER OF DEMANDS FOR THIS FARP
      IUNIT(IN1,69) = NCELLS
C     TAKE CARE OF THE SINGLE CELL FARP
      IF(NCELLS .GT. 1)GO TO 103
      DELTIM = TCILNG / 2.
C     FIND PROPER AMMO TO UPDATE
  103 DO 104 III = 1,5
      IIJ = III * 12 - 4
C     IF WRONG AMMO GO TO 104
      IF(IUNIT(IN1,IIJ) .NE. IRDJF(3))GO TO 104
C     HAVE PROPER AMMO UPDATE HOLDING AREA IN IUNIT
      IUNIT(IN1,IIJ+9) = NHELCL - NWPNAL
      IUNIT(IN1,IIJ+10) = NWPNSH
      IUNIT(IN1,IIJ+11) = NRNSH
C     SCHEDULE FIRST DEMAND EVENT
      TOTTIM = TIME + DELTIM
      CALL SCHED(1,IPARM,TOTTIM)
      GO TO 20
  104 CONTINUE
      GO TO 20
C      HAVE AN ARTY UNIT.  BUILD EXO AND SCHED DEMAND
  102 TOTTIM = TCIST + 60.
      CALL SCHED(1,IPARM,TOTTIM)
C     FIND AMMO TYPES TO UPDATE IUNIT HOLDIND FOR ARTY
      IUNIT(IN1,69) = TCILNG / 60. + .5
      DO 300 IA = 1,5
C     SELECT AMMO RECORD FROM IRDJF
      IAM = 5 *  IA - 2
      IAMM = IRDJF(IAM)
C     FIND CORRESPONDING UNIT AMMO
      DO 290 IU = 1,5
      IUA = 12 * IU - 4
      IUAM = IUNIT(IN1,IUA)
C     IF NOT THE SAME AMMO GO TO 290
      IF(IUAM .NE. IAMM)GO TO 290
C     HAVE AMMO MATCH.  SET UP FILE IUNIT.
      IUNIT(IN1,IUA+9)= IUNIT(IN1,IUA+1) - IRDJF(IAM+1)
      IF(IUNIT(IN1,IUA+9) .LT. 0)IUNIT(IN1,IUA+9) = 0
      IUNIT(IN1,IUA+10) = IRDJF(IAM+2)
      IUNIT(IN1,IUA+11) = IRDJF(IAM+3)
      GO TO 300
  290 CONTINUE
      WRITE (LUOUT,291)IN1,IAMM
```

```
291 FORMAT("  NO IUNIT AMM MATCH - RDJIFF, UNIT ",I5,"  AMMO ",I5)
    GO TO 20
300 CONTINUE
    GO TO 20
200 WRITE(LUOUT,400)
    WRITE(2,400)
400 FORMAT("  HAVE FINISHED RDJIFF ")
    RETURN
    END
```

mm. SUBROUTINE: READF

PURPOSE: Accepts up to 10 integers, real and/or alpha fields from the operator.

COMMON BLOCKS: None

CALLS: EOF
FLOAT

IS CALLED BY: EDIT
TRKPUT

CALLING PARAMETERS: LU -- Logistical unit number of input.
NUM -- Maximum number of each type of field to be accepted in a single line.
INTGR -- Array for storing up to NUM integer fields.
REAL -- Array for storing up to NUM real fields.
IWORD -- Array for storing up to NUM alphanumeric fields.

LOCAL ARRAYS: ICHR(82) -- Local array to accept field of 80 characters input by the operator.
IALDIG(10) -- Local array to store the integers 1 through 0.

FUNCTIONS:

Reads 80 characters of input from logical unit LU.

Initialize integer, real and alphanumeric storage arrays.

Determines if each field is real, integer or alphanumeric.

Builds fields, character by character using blanks and/or commas as separators.

```
      SUBROUTINE READF (LU, NUM, INTGR, REAL, IWORD)
C**** RETURNS UP TO NUM INTEGERS, REALS, AND STRINGS.
C**** BLANKS AND COMMAS ARE DELIMITERS
C**** H. JONES    1979
      DIMENSION INTGR(1), REAL(1), IWORD(1)
      DIMENSION ICHR(82), IALDIG(10)
      DATA IBLANK /" "/, IPERD /"."/, ICOMMA /","/, IMINUS /"-"/
      DATA  IQUOT/1H"/
      DATA IALDIG /"1","2","3","4","5","6","7","8","9","0"/
      ICHR(81) = IBLANK
      ICHR(82) = IQUOT
C
C**** READ RECORD, ZERO OUT OLD INTGR, REAL, IWORD
      READ(LU,100) (ICHR(I), I=1,80)
      IF(EOF(LU) .NE. 0) GO TO 60
      DO 4 I=1,NUM
      INTGR(I)=0
      REAL(I)=0.
    4 IWORD(I)  = IBLANK
      KWORD=0
      KINTGR=0
      KREAL=0
      N=0
C
C**** CHECK NEXT CHARACTER IN RECORD
C**** SKIPPING BLANKS **********
   10 MINUS = 1
   11 N=N+1
      IF(N.EQ.81) GO TO 60
      IF(ICHR(N).EQ.IBLANK) GO TO 11
C
C**** DETERMINE IF CHAR IS NUMBER OF ALPHA
      IF(ICHR(N) .EQ. IQUOT) GO TO 41
      IF(ICHR(N) .NE. IMINUS) GO TO 12
      MINUS = -1
      GO TO 11
   12 ISTART = N
      NUMB=0
      IF(ICHR(N).EQ.IPERD) GO TO 28
      DO 15 I=1,10
      IF(ICHR(N).EQ.IALDIG(I)) GO TO 20
   15 CONTINUE
      GO TO 40
C
C**** BUILDING INTEGER OR INTEGER PART OF REAL
   20 N=N+1
      IF(ICHR(N) .NE. IBLANK  .AND.  ICHR(N) .NE. IPERD
     Z  .AND.  ICHR(N) .NE. ICOMMA ) GO TO 20
C
C**** CALCULATE VALUE OF INTEGER
      IEND = N-1
      NUMB=0
      DO 25 I=ISTART,IEND
      DO 24 J=1,9
      IF(ICHR(I) .EQ. IALDIG(J)) GO TO 25
   24 CONTINUE
      J=0
   25 NUMB = NUMB +  J * 10 **(IEND-I)
      IF(ICHR(N) .EQ. IPERD) GO TO 28
C
C**** NUMBER WAS INTEGER, STORE IT, CHECK FOR BLANKS
      KINTGR = KINTGR +1
      INTGR(KINTGR) = NUMB * MINUS
      GO TO 10
C
C**** NUMBER WAS INTEGER PART OF REAL, NOW BUILD DECIMAL.
   28 RNUMB = FLOAT(NUMB)
      ISTART = N+1
      IF(ICHR(ISTART) .EQ. IBLANK) GO TO 39
   30 N=N+1
      IF(ICHR(N).NE.IBLANK .AND. ICHR(N).NE.ICOMMA ) GO TO 30
C
C**** CALCULATE VALUE OF DECIMAL
      IEND = N-1
      IDECPL = 1
      NUMB=0
      DO 38 I=ISTART,IEND
      DO 34 J=1,9
      IF(ICHR(I) .EQ. IALDIG(J)) GO TO 35
   34 CONTINUE
      J=0
   35 NUMB = NUMB +  J * 10**(IEND-I)
   38 IDECPL = IDECPL * 10
C
C**** ADD INTEGER AND DECIMAL
      DECML=FLOAT(NUMB)/FLOAT(IDECPL)
      RNUMB = RNUMB + DECML
   39 KREAL = KREAL + 1
      REAL(KREAL) = RNUMB * MINUS
      GO TO 10
C
C**** BUILDING STRING ALPHANUMERIC
   40 N=N+1
      IF(ICHR(N).NE.IBLANK .AND. ICHR(N).NE.ICOMMA ) GO TO 40
      GO TO 44
   41 ISTART = N+1
   42 N=N+1
      IF(ICHR(N) .NE. IQUOT) GO TO 42
   44 IEND = N-1
      KWORD = KWORD + 1
      LENSTR = IEND - ISTART + 1
      IF(LENSTR .GT. 10) LENSTR = 10
       ENCODE(LENSTR, 90, IWORD(KWORD))  (ICHR(KKK), KKK=ISTART, IEND)
      GO TO 10
C
   60 RETURN
```

```
 90 FORMAT(10A1)
100 FORMAT(80A1)
    END
```

nn. SUBROUTINE: SCHED

PURPOSE: Schedules events.

COMMON BLOCKS: None

CALLS: CONTRL
LOOKEV
PUTEVT

IS CALLED BY: ASP
ASPARV
ASPAR1
ATP
ATPARV
CSAARV
DEMAND
HELARV
RELOAD
INIT
LDPWDR
RDIEXO
RDJIFF

CALLING PARAMETERS: ITYPE -- ARM event code.
IPARM(5) -- Parameters for the event.
TIME -- Time that the event is scheduled to occur.

LOCAL ARRAYS: None.

FUNCTIONS:

Sets IPARM(5) to event type.

Calls LOOKEV to determine if event should be displayed.

Calls PUTEVT to place the event in the EVENT array.

If PUTEVT was unsuccessful displays message and calls CONTRL.

```
      SUBROUTINE SCHED (ITYPE, IPARM, TIME)
C**** INTERFACE ROUTINE TO SCHEDULE EVENT
C**** H. JONES    DEC 78
      DIMENSION IPARM(5)
      IPARM(5)=ITYPE
      CALL LOOKEV (ITYPE+0, IPARM, TIME+0., 0)
      ITH = TIME
      ITS = (TIME - ITH) * 3600
      CALL PUTEVT (IPARM, ITH, ITS, ICHECK)
      IF(ICHECK .EQ. 0) GO TO 20
      WRITE(2,30) ICHECK
      CALL CONTRL(TIME)
   20 RETURN
   30 FORMAT(" TOO MANY EVENTS -- ",I6)
      END
```

oo. SUBROUTINE: SETQUE

PURPOSE: Initializes truck queues to zero by replacing all pointers with zeros.

COMMON BLOCKS: QUENUM
QUEPNT

CALLS: None

IS CALLED BY: TRKPUT

CALLING PARAMETERS: ITEMS -- The number of trucks that will be placed in queues.
NUMQUE -- Total number of queues receiving trucks.

LOCAL ARRAYS: None.

FUNCTIONS:

Zeroes the queue directories.

```
      SUBROUTINE SETQUE (ITEMS, NUMQUE)
C**** SETS UP NUMQUE EMPTY QUEUES FOR ITEMS.
C**** H. JONES     DEC 78
      COMMON /QUENUM/ NHEAD(136)
      COMMON /QUEPNT/ IPNT(560)
      DO 10 I=1,NUMQUE
   10 NHEAD(I) = 0
      DO 20 I=1,ITEMS
   20 IPNT(I) = 0
      RETURN
      END
```

pp. SUBROUTINE: TRKPUT

PURPOSE: Enables interactive truck assignment, unassignment, and/or reassignment to queues.

COMMON BLOCKS: None

CALLS: GETQUE
NXTQUE
PUTQUE
READF
SETQUE

IS CALLED BY: CONTRL

CALLING PARAMETERS: None.

LOCAL ARRAYS: INTGR (10) -- Holds up to 10 integer fields from the operator input.
REAL (10) -- Holds up to 10 real fields from the operator input.
IWORD (10) -- Holds up to 10 alphanumeric fields from the operator input.

FUNCTIONS:

Displays names.

Accepts operator input by calling READF and does one of the following.

Puts truck into queue.

Pulls truck from queue.

Lists truck from a queue.

Initializes pointers removing all trucks from all queues.

```
      SUBROUTINE TRKPUT
C**** ALLOWS INTERACTIVE TRUCK QUEUE RE-ASSIGNMENT
C**** H. JONES    FEB 79
      DIMENSION INTGR(10), REAL(10), IWORD(10)
C
      WRITE(2,10)
   10 FORMAT(1X,"COMMAND EXAMPLES :",/,
     Z  1X,"GET 3 FROM 35 ",/,
     Z  1X,"PUT 3, 10 IN 105 ",/,
     Z  1X,"LIST 105 ",/,
     Z  1X,"TAKE ALL OUT ",/,
     Z  1X,"END ",/)
C
   15 WRITE(2,20)
   20 FORMAT(" ...   ")
      CALL READF (1, 10, INTGR, REAL, IWORD)
      IF(IWORD(1) .EQ. "END" .OR. IWORD(1) .EQ. "E") GO TO 50
      IF(IWORD(1) .EQ. "PUT" .OR. IWORD(1) .EQ. "P") GO TO 30
      IF(IWORD(1) .EQ. "LIST" .OR. IWORD(1) .EQ. "L") GO TO 40
      IF(IWORD(1) .EQ. "GET" .OR. IWORD(1) .EQ. "G") GO TO 25
      IF(IWORD(1) .EQ. "TAKE" .OR. IWORD(1) .EQ. "T") GO TO 60
      GO TO 15
C
C**** GET TRUCK FROM QUEUE WITHOUT RE-ORDERING QUEUE
   25 I1 = INTGR(1)
      I2 = INTGR(2)
      IF(INTGR(3) .NE. 0) GO TO 15
      IFLAG = 0
      CALL NXTQUE (IFIRST, I2)
   26 CALL NXTQUE(NTRK, I2)
      IF(NTRK.EQ.0) GO TO 15
      IF(NTRK .EQ. IFIRST  .AND. IFLAG .NE. 0) GO TO 15
      CALL GETQUE(NTRK, I2)
      IF(I1 .EQ. IFIRST) GO TO 15
      IF(I1 .NE. NTRK) CALL PUTQUE (NTRK, I2)
      IFLAG = 1
      GO TO 26
C
C**** PUT TRUCK IN QUEUE
   30 I1 = INTGR(1)
      I2 = INTGR(2)
      I3 = INTGR(3)
      IF(INTGR(3) .EQ. 0) I3 = INTGR(2)
      IF(INTGR(3) .EQ. 0) I2 = INTGR(1)
      DO 35 I=I1,I2
   35 CALL PUTQUE (I, I3)
      GO TO 15
C
C**** LIST TRUCKS IN QUEUE
   40 CALL NXTQUE (IFIRST, INTGR(1))
      IF(IFIRST .EQ. 0) GO TO 15
   42 CALL GETQUE(NTRK, INTGR(1))
      CALL PUTQUE(NTRK, INTGR(1))
      WRITE(2,45) NTRK
   45 FORMAT(1X,I5)
      CALL NXTQUE (INEXT, INTGR(1))
      IF(INEXT .NE. IFIRST) GO TO 42
      GO TO 15
C
C**** TAKE ALL TRUCKS OUT OF QUEUES
   60 CALL SETQUE (560, 136)
      GO TO 15
C
   50 RETURN
      END
```

qq. SUBROUTINE: TRKTIM

PURPOSE: Initializes the ITRUCK arrays with time since last failure.

COMMON BLOCKS: LOG

CALLS: RANF

IS CALLED BY: INIT

CALLING PARAMETERS: None.

LOCAL ARRAYS: None.

FUNCTIONS:

Asks operator if truck times since last failure should be initialized; if no, returns. Else loops through the trucks.

Determines the truck type and mean time between failure (MTBF) for the truck type.

Draws a number from a uniform distribution (0-1) and multiply it by MTBF to determine the time since the last failure.

Stores calculated time since the last failure in ITRUCK.

```
      SUBROUTINE TRKTIM
C
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,21), INTER(9),
     Z  IRSTME(20,3), IATPSD(5), IDAY, TIME,
     $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
C
      WRITE(2,90)
 90   FORMAT(" INITIALIZE TRUCKS' TIME SINCE LAST FAILURE? (YES/NO)")
      READ(1,20)IANS
  20  FORMAT(A10)
      IF(IANS.EQ."NO".OR.IANS.EQ."N") GO TO 35
C**** LOOP THROUGH TRUCKS
      ITOP = LPPAR(4)
      DO 80 I = 1,ITOP
      ITYP = ITRUCK(I,1)
C**** IF NOT ACTIVE BYPASS
      IF (ITYP .EQ. 0) GO TO 80
C**** FIND MTBF
      XMTBF = ITYPE(ITYP,5)
C**** FIND UNIFORM RANDOM NUMBER
      UNRN =RANF(X)
C**** STORE TIME SINCE MAINT. FOR THIS TRUCK
      ITRUCK(I,7) = XMTBF * UNRN
 80   CONTINUE
C
  35  RETURN
      END
```

rr. SUBROUTINE: TRUCK

PURPOSE: Writes the status of unit trucks

COMMON BLOCKS: LOG

CALLS: None

IS CALLED BY: Report

CALLING PARAMETERS: None.

LOCAL ARRAYS: None.

FUNCTIONS:

Finds trucks assigned to a given unit and prints the current status of each truck.

```
      SUBROUTINE TRUCK  (L)
C**** WRITES STATUS OF UNIT TRUCKS
C**** D REMEN JUN 79
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
     Z  IRSTME(20,3), IATPSD(5), IDAY, TIME,
     $  ICSA(20), LPPAR(6), IASPAM(4,20), LUOUT, TCIST, TCILNG, LOOK(17)
C**** WRITE HEADER
      WRITE(LUOUT,20)IUNIT(L,7)
   20 FORMAT(1X,///,8X," TRUCK STATUS REPORT FOR UNIT ",A10,///,
     Z     "      TRK      NM   STATUS   MIX  PCLOAD  NXFAIL",/)
C**** LOOP THROUGH THE TRUCKS
      DO 5 J = 1,560
C**** IF TRUCK NOT OF THIS UNIT, BYPASS
      IF(ITRUCK(J,4) .NE. L)GO TO 5
      IF(ITRUCK(J,2) .NE. 1)GO TO 5
C**** HAVE TRUCK OF THIS UNIT PRINT INFO
      NXFAIL = ITYPE(ITRUCK(J,1),5) - ITRUCK(J,7)
      WRITE(LUOUT,30) J, ITRUCK(J,2), ITRUCK(J,3), ITRUCK(J,5),
     Z      ITRUCK(J,6), NXFAIL
   30 FORMAT (2X,6I7)
    5 CONTINUE
      RETURN
      END
```

6. DESCRIPTION OF ASSOCIATED PROGRAMS. Although ARM is self sufficient to accomplish all tasks associated with ammunition resupply simulation there are several other programs that have been developed to assist the ARM operator in accomplishing the tasks associated with data base development. This section will present a description of each of these programs and their functions. See appendix A for computer listings of these programs.

a. PROGRAM: HJEDIT

PURPOSE: To call HUEDIT which allows editing of data base separately from ARM.

COMMON BLOCKS: LOG, QUENUM, QUEPNT

CALLS: HUEDIT

IS CALLED BY: Operator

CALLING PARAMETERS: None

LOCAL ARRAYS: None

FUNCTIONS: Connects the data base and HUEDIT, generates an output file of revised data base, returns keyboard and binary file.

b. PROGRAM: HUEDIT

PURPOSE: To permit building of initial data base or modification of existing data base without calling HJARMANOTHER.

COMMON BLOCKS: LOG, QUENUM, QUEPNT

CALLS: EDIT, UPDATE

IS CALLED BY: HJEDIT

CALLING PARAMETERS: NONE

LOCAL ARRAYS: None

FUNCTIONS: Calls EDIT if editing of data is desired.
Calls UPDATE if updating of arrays is desired.

c. SUBROUTINE: EDIT

PURPOSE: To edit data base, functions the same as the edit subroutine within ARM (see w. Subroutine: Edit)

```
    PROGRAM HJEDIT
100=CONNECT,KEYBRD,DISPLY.
110=ATTACH,AA,HCEDIT,MR=1,ID=CARTSV.
120=AA(KEYBRD,DISPLY,T1,TAPE1,INPUT,OUTPUT,TAPE6=OUTPUT).
130=RETURN,KEYBRD,DISPLY,AA.
140=REWIND,TAPE1,OUTPUT.
150=*EOR
160=*EOF



    PROGRAM HUEDIT (TAPE1, TAPE2, TAPE3, TAPE4, INPUT, OUTPUT)
    COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
   Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(9),
   Z  IRSTME(20,3), IATPSD(5), IDAY, TIME,
   $  ICSA(20), LPPAR(5), IASPAM(4,20), LUOUT, TCIST, TCILNG,LOOK(17)
    COMMON /QUENUM/ IHEAD(136)
    COMMON /QUEPNT/ ITEMS(560)
    DATA LOOK /17*0/
    READ(3) IATP,IASP,IUNIT,ITRUCK,ITYPE,IMIX,
   Z INTER,IRSTME,IATPSD,IDAY,TIME,ICSA,
   Z LPPAR,IASPAM,LUOUT,TCIST,TCILNG,IHEAD,ITEMS
10  WRITE(2,7)
7   FORMAT(" EDIT DATA FILE ? (YES/NO)  ")
    READ(1,17) IANS
17  FORMAT(A10)
    IF(IANS.EQ."NO".OR.IANS.EQ."N") GO TO 20
    CALL EDIT
    GO TO 10
 20 PRINT*,"UPDATE ARRAYS?
    READ21,IYN
 21 FORMAT(A1)
    IF(IYN.EQ."N")GOTO30
    CALL UPDATE
    GOTO10
30  WRITE(4) IATP,IASP,IUNIT,ITRUCK,ITYPE,IMIX,
   Z INTER,IRSTME,IATPSD,IDAY,TIME,ICSA,LPPAR,IASPAM,LUOUT,
   Z TCIST,TCILNG,IHEAD,ITEMS
    STOP
    END
```

```
      SUBROUTINE EDIT
**** ALLOWS EDITING OF DATA IN COMMON LOG
**** H. JONES    FEB 79
**** NOTE ALL VARIABLES IN COMMON LOG ARE 2 DIMENSIONAL
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(1,9),
     Z  IRSTME(20,3), IATPSD(1,5)
     $  IDAY(1,1), TIME(1,1), ICSA(1,20), LPPAR(1,5),
     Z  IASPAM(4,20), LUOUT(1,1), TCIST(1,1), TCILNG(1,1),LOOK(1,17)
      COMMON /QUENUM/ IHEAD(136)
      COMMON /QUEPNT/ ITEMS(560)
      DIMENSION   INTGR(10), REAL(10), IWORD(10)
      DIMENSION NAME(19), LIMIT1(19), LIMIT1(19), LIMIT2(19)
      DATA NAME /"IATP", "IASP", "IUNIT", "ITRUCK", "ITYPE",
     Z  "IMIX", "INTER", "IRSTME", "IASPSD", "IATPSD", "IDAY",
     Z   "TIME", "ICSA",  "LPPAR",  "IASPAM", "LUOUT", "TCIST",
     $  "TCILNG", "LOOK"/
      DATA LIMIT1 /4, 4, 75, 560, 6,
     Z   40, 1, 20, 1, 1, 1,
     Z     1, 1,  1, 4, 1, 1, 1, 17/
      DATA LIMIT2 /30, 41, 69, 7, 6,
     Z   23, 9, 3, 5, 5, 1,
     Z     1, 20, 5, 20, 1, 1, 1, 1/
      DATA IEND/"END"/
      NNAMES = 19
   10 WRITE(2,100)
      LU1 - 1
      CALL READF (LU1, 10, INTGR, REAL, IWORD)
**** BRANCH ON DATA TYPE
   15 IF(IWORD(1) .EQ. IEND) GO TO 95
      DO 20 KTYPE = 1,NNAMES
      IF(IWORD(1) .EQ. NAME(KTYPE)) GO TO 30
   20 CONTINUE
      GO TO 10
**** SET LIMITS FOR DATA TYPE
   30 ILOW = INTGR(1)
      IHIGH = INTGR(2)
      IFLG = 0
      IF(ILOW .EQ. 0 .AND. IHIGH .EQ. 0) IFLG = 1
      IF(IFLG .EQ. 1) ILOW = 1
      IF(IFLG .EQ. 1) IHIGH = LIMIT1(KTYPE)
      IF(IHIGH .EQ. 0) IHIGH = ILOW
      IF(IHIGH .GT. LIMIT1(KTYPE))  IHIGH = LIMIT1(KTYPE)
      IF(ILOW .GT. LIMIT1(KTYPE)) GO TO 10
**** BACKGROUND HAS BEEN SET, READ CHANGE OR LIST COMMAND
   40 WRITE(2,120)
      CALL READF (LU1, 10, INTGR, REAL, IWORD)
      IF(IWORD(1) .EQ. "LIST" .OR. IWORD(1) .EQ. "L") GO TO 50
      IF(IWORD(1) .EQ. "CHANGE" .OR. IWORD(1) .EQ. "C") GO TO 80
      GO TO 15
**** LIST COMMAND
   50 IATT1 = INTGR(1)
      IATT2 = INTGR(2)
      IFLG = 0
      IF(IATT1 .EQ. 0 .AND. IATT2 .EQ. 0) IFLG = 1
      IF(IFLG .EQ. 1) IATT1 = 1
      IF(IFLG .EQ. 1) IATT2 = LIMIT2(KTYPE)
      IF(IATT2 .EQ. 0) IATT2 = IATT1
      IF(IATT2 .GT. LIMIT2(KTYPE))  IATT2 = LIMIT2(KTYPE)
      IF(IATT1 .GT. LIMIT2(KTYPE)) GO TO 40
      DO 70 INDEX = ILOW, IHIGH
      WRITE(2,140) NAME(KTYPE), INDEX
      DO 70 IATT = IATT1, IATT2
      IF(KTYPE .EQ. 1) IVALUE = IATP(INDEX, IATT)
      IF(KTYPE .EQ. 2) IVALUE = IASP(INDEX, IATT)
      IF(KTYPE .EQ. 3) IVALUE = IUNIT(INDEX, IATT)
      IF(KTYPE .EQ. 4) IVALUE = ITRUCK(INDEX, IATT)
      IF(KTYPE .EQ. 5) IVALUE = ITYPE(INDEX, IATT)
      IF(KTYPE .EQ. 6) IVALUE = IMIX(INDEX, IATT)
      IF(KTYPE .EQ. 7) IVALUE = INTER(INDEX, IATT)
      IF(KTYPE .EQ. 8) IRSTME(INDEX, IATT)
      IF(KTYPE .EQ. 10) IVALUE = IATPSD(INDEX, IATT)
      IF(KTYPE .EQ. 11) IVALUE = IDAY(INDEX, IATT)
      IF(KTYPE .EQ. 12) IVALUE = TIME(INDEX, IATT)
      IF(KTYPE .EQ. 13) IVALUE = ICSA(INDEX, IATT)
      IF(KTYPE .EQ. 14) IVALUE = LPPAR(INDEX, IATT)
      IF(KTYPE .EQ. 15) IVALUE = IASPAM(INDEX, IATT)
      IF(KTYPE .EQ. 16) IVALUE = LUOUT(INDEX, IATT)
      IF(KTYPE .EQ. 17) IVALUE = TCIST(INDEX, IATT)
      IF(KTYPE .EQ. 18) IVALUE = TCILNG(INDEX, IATT)
      IF(KTYPE .EQ. 19) IVALUE = LOOK(INDEX, IATT)
      IF(KTYPE .NE. 3) GO TO 60
      IF(IATT .NE. 6  .AND. IATT .NE. 7) GO TO 60
      WRITE(2,160) IATT, IVALUE
      GO TO 70
   60 WRITE(2,150) IATT, IVALUE
   70 CONTINUE
      GO TO 40
**** CHANGE COMMAND
   80 IATT = INTGR(1)
      VALUE = INTGR(2) + REAL(1)
      IF(IATT .GT. LIMIT2(KTYPE))  GO TO 40
      DO 90 INDEX = ILOW, IHIGH
      INSERT VALUE IN PROPER ARRAY
      IF(KTYPE .EQ. 1) IATP(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 2) IASP(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 3) IUNIT(INDEX, IATT) = VALUE
      IF(KTYPE.EQ.3.AND.(IATT.EQ.6.ORIATT.EQ.7))
     Z IUNIT(INDEX,IATT)=IWORD(2)
      IF(KTYPE .EQ. 4) ITRUCK(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 5) ITYPE(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 6) IMIX(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 7) INTER(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 8) IRSTME(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 10) IATPSD(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 11) IDAY(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 12) TIME(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 13) ICSA(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 14) LPPAR(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 15) IASPAM(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 16) LUOUT(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 17) TCIST(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 18) TCILNG(INDEX, IATT) = VALUE
   90 CONTINUE
      GO TO 40
   95 RETURN
  100 FORMAT(1X,"VARIABLE NAME = ")
  120 FORMAT(1X,",,")
  140 FORMAT(/,1X,A10,I5)
  150 FORMAT(1X,"ATTRIBUTE ",I4," = ",I7)
  160 FORMAT(1X,"ATTRIBUTE ",I4," = ",A10)
      END
      SUBROUTINE READF (LU, NUM, INTGR, REAL, IWORD)
**** RETURNS UP TO NUM INTEGERS, REALS, AND STRINGS.
**** BLANKS AND COMMAS ARE DELIMITERS
**** H. JONES    1979
      DIMENSION INTGR(1), REAL(1), IWORD(1)
      DIMENSION ICHR(82), IALDIG(10)
      DATA IBLANK /" "/, IPERD /"."/, ICOMMA /","/, IMINUS /"-"/
      DATA  IQUOT/1H"/
      DATA IALDIG /"1","2","3","4","5","6","7","8","9","0"/
      ICHR(81) = IBLANK
      ICHR(82) = IQUOT
**** READ RECORD, ZERO OUT OLD INTGR, REAL, IWORD
      READ(LU,100) (ICHR(I), I=1,80)
      IF(EOF(LU) .NE. 0) GO TO 60
      OD 4 I=1,NUM
      INTGR(I)=0
      REAL(I)=0.
    4 IWORD(I) = IBLANK
      KWORD=0
      KINTGR=0
      KREAL=0
      N=0
**** CHECK NEXT CHARACTER IN RECORD
**** SKIPPING BLANKS **********
   10 MINUS = 1
   11 N=N+1
      IF(N.EQ.81) GO TO 60
      IF(ICHR(N).EQ.IBLANK) GO TO 11
**** DETERMINE IF CHAR IS NUMBER OR ALPHA
      IF(ICHR(N) .EQ. IQUOT) GO TO 41
      IF(ICHR(N) .NE. IMINUS) GO TO 12
      MINUS = -1
      GO TO 11
   12 ISTART = N
      NUMB=0
      IF(ICHR(N).EQ.IPERD) GO TO 28
      DO 15 I=1,10
      IF(ICHR(N).EQ.IALDIG(I)) GO TO 20
   15 CONTINUE
      GO TO 40
**** BUILDING INTEGER OR INTEGER PART OF REAL
   20 N=N+1
      IF(ICHR(N) .NE. IBLANK  .AND.  ICHR(N) .NE. IPERD
     Z  .AND.  ICHR(N) .NE. ICOMMA ) GO TO 20
**** CALCULATE VALUE OF INTEGER
      IEND = N-1
      NUMB=0
      DO 25 I=ISTART,IEND
      DO 24 J=1,9
      IF(ICHR(I) .EQ. IALDIG(J)) GO TO 25
   24 CONTINUE
      J=0
   25 NUMB = NUMB +  J * 10 **(IEND-I)
```

```
      IF(ICHR(N) .EQ. IPERD) GO TO 28
****  NUMBER WAS INTEGER, STORE IT, CHECK FOR BLANKS
      KINTGR = KINTGR +1
      INTGR(KINTGR) = NUMB * MINUS
      GO TO 10
****  NUMBER WAS INTEGER PART OF REAL, NOW BUILD DECIMAL.
   28 RNUMB = FLOAT(NUMB)
      ISTART = N+1
      IF(ICHR(ISTART) .EQ. IBLANK) GO TO 39
   30 N=N+1
      IF(ICHR(N).NE.IBLANK .AND. ICHR(N).NE.ICOMMA ) GO TO 30
****  CALCULATE VALUE OF DECIMAL
      IEND = N-1
      IDECPL = 1
      NUMB=0
      DO 38 I=ISTART,IEND
      DO 34 J=1,9
      IF(ICHR(I) .EQ. IALDIG(J)) GO TO 35
   34 CONTINUE
      J=0
   35 NUMB = NUMB +  J * 10**(IEND-I)
   38 IDECPL = IDECPL * 10
****  ADD INTEGER AND DECIMAL
      DECML=FLOAT(NUMB)/FLOAT(IDECPL)
      RNUMB = RNUMB + DECML
   39 KREAL = KREAL + 1
      REAL(KREAL) = RNUMB * MINUS
      GO TO 10
****  BUILDING STRING ALPHANUMERIC
   40 N=N+1
      IF(ICHR(N).NE.IBLANK .AND. ICHR(N).NE.ICOMMA ) GO TO 40
      GO TO 44
   41 ISTART = N+1
   42 N=N+1
      IF(ICHR(N) .NE. IQUOT) GO TO 42
   44 IEND = N-1
      KWORD = KWORD + 1
      LENSTR = IEND - ISTART + 1
      IF(LENSTR .GT. 10) LENSTR = 10
       ENCODE(LENSTR, 90, IWORD(KWORD))  (ICHR(KKK), KKK=ISTART, IEND)
      GO TO 10
   60 RETURN
   90 FORMAT(10A1)
  100 FORMAT(80A1)
      END
```

d. SUBROUTINE: UPDATE

PURPOSE: Allows faster update of data arrays in COMMON LOG.

COMMON BLOCKS: LOG, QUENUM, QUEPNT

CALLS: None

IS CALLED BY: HUEDIT

CALLING PARAMETERS: None

LOCAL ARRAYS: INTGR(10)--Storage for up to 10 real number fields input from the console.

REAL (10)--Storage for up to 10 real number fields input from the console.

IWORD (10)--Storage for up to 10 alpha numeric fields input from the console.

NAME (19)--Storage for the names of the 19 arrays and variables in COMMON LOG.

LIMIT (19)--Storage for the upper limit on the first index of the arrays and variables in COMMON LOG.

FUNCTIONS: Displays to the operator a message requesting input as to the variable name in COMMON LOG that is of interest.

Accepts from operator the message as to which variable.

Displays message requesting input as to whether a change or replacement of attribute values is desired.

Accepts operators response.

Displays message requesting variable word number, attribute number, and new value or change (--value/+ value).

An input of 0, 0, 0 exists the logic.
An input of "END" exists the program.

```
      SUBROUTINE UPDATE
**** ALLOWS FASTER UPDATE OF DATA IN COMMON/LOG/
**** G. MARTIN   JULY 79
      COMMON /LOG/ IATP(4,30), IASP(4,41), IUNIT(75,69),
     Z  ITRUCK(560,7), ITYPE(6,6), IMIX(40,23), INTER(1,9),
     Z  IRSTME(20,3), IATPSD(1,5),
     $  IDAY(1,1), TIME(1,1), ICSA(1,20), LPPAR(1,5)
     Z  IASPAM(4,20), LUOUT(1,1), TCIST(1,1), TCILNG(1,1),LOOK(1,17)
      COMMON /QUENUM/ IHEAD(136)
      COMMON /QUEPNT/ ITEMS(560)
      DIMENSION   INTGR(10), REAL(10), IWORD(10)
      DIMENSION NAME(19), LIMIT1(19), LIMIT2(19)
      DATA NAME /"IATP", "IASP", "IUNIT", "ITRUCK", "ITYPE",
     Z  "IMIX", "INTER", "IRSTME", "IASPSD", "IATPSD", "IDAY",
     Z   "TIME", "ICSA",  "LPPAR",  "IASPAM", "LUOUT", "TCIST",
     $  "TCILNG", "LOOK"/
      DATA LIMIT1 /4, 4, 75, 560, 6,
     Z   40, 1, 20, 1, 1, 1,
     Z    1, 1,  1, 4, 1, 1, 1, 17/
      DATA LIMIT2 /30, 41, 69, 7, 6,
     Z   23, 9, 3, 5, 5, 1,
     Z    1, 20, 5, 20, 1, 1, 1, 1/
      DATA IEND/"END"/
  100 PRINT*,"VARIABLE NAME (OR END)-   "
      READ1,NRAY
    1 FORMAT(A6)
      IF(NRAY.EQ."END   ")GOTO1000
      DO 200 I=1,19
      INUM=I
      IF(NRAY.EQ.NAME(I))GOTO210
  200 CONTINUE
      PRINT2,NRAY
    2 FORMAT(" VARIABLE NAME ",A6," NOT VALID.")
      GOTO100
  210 PRINT*,"CHANGE OR REPLACE?  "
      READ3,ICR
    3 FORMAT(A1)
      IF(ICR.EQ."C".OR.ICR.EQ."R")GOTO300
      PRINT*,"ENTER C TO CHANGE (+ OR -) EXISTING VALUES"
      PRINT*,"      R TO REPLACE EXISTING VALUES"
      GOTO210
  300 PRINT*,"ENTER WORD#,ATTRIBUTE#,NEW VALUE (OR CHANGE)"
      PRINT*,"(0,0,0 WHEN DONE)-  "
  310 READ*,IWD,IAT,VAL
      IF(IWD.EQ.0)GOTO100
      IF(IWD.LT.0.OR.IWD.GT.LIMIT1(INUM))GOTO320
      IF(IWD.GT.0.AND.IAT.LE.LIMIT2(INUM))GOTO340
  320 PRINT*,"WORD# OR ATTRIB.# INVALID--ENTRY IGNORED"
  330 PRINT*,"NEXT-   "
      GOTO310
  340 IF(ICR.EQ."C")GOTO350
      IF(INUM.EQ.1)IATP(IWD,IAT)=IFIX(VAL)
      IF(INUM.EQ.2)IASP(IWD,IAT)=IFIX(VAL)
      IF(INUM.EQ.3)IUNIT(IWD,IAT)=IFIX(VAL)
      IF(INUM.EQ.4)ITRUCK(IWD,IAT)=IFIX(VAL)
      IF(INUM.EQ.5)ITYPE(IWD,IAT)=IFIX(VAL)
      IF(INUM.EQ.6)IMIX(IWD,IAT)=IFIX(VAL)
      IF(INUM.EQ.7)INTER(IWD,IAT)=IFIX(VAL)
      IF(INUM.EQ.8)IRSTME(IWD,IAT)=IFIX(VAL)
      IF(INUM.EQ.10)IATPSD(IWD,IAT)=IFIX(VAL)
      IF(INUM.EQ.11)IDAY(IWD,IAT)=IFIX(VAL)
      IF(INUM.EQ.12)TIME(IWD,IAT)=VAL
      IF(INUM.EQ.13)ICSA(IWD,IAT)=IFIX(VAL)
      IF(INUM.EQ.14)LPPAR(IWD,IAT)=IFIX(VAL)
      IF(INUM.EQ.15)IASPAM(IWD,IAT)=IFIX(VAL)
      IF(INUM.EQ.16)LUOUT(IWD,IAT)=IFIX(VAL)
      IF(INUM.EQ.17)TCIST(IWD,IAT)=VAL
      IF(INUM.EQ.18)TCILNG(IWD,IAT)=VAL
      IF(INUM.EQ.19)LOOK(IWD,IAT)=IFIX(VAL)
      GOTO330
  350 IF(INUM.EQ.1)IATP(IWD,IAT)=IATP(IWD,IAT)+IFIX(VAL)
      IF(INUM.EQ.2)IASP(IWD,IAT)=IASP(IWD,IAT)+IFIX(VAL)
      IF(INUM.EQ.3)IUNIT(IWD,IAT)=IUNIT(IWD,IAT)+IFIX(VAL)
      IF(INUM.EQ.4)ITRUCK(IWD,IAT)=ITRUCK(IWD,IAT)+IFIX(VAL)
      IF(INUM.EQ.5)ITYPE(IWD,IAT)=ITYPE(IWD,IAT)+IFIX(VAL)
      IF(INUM.EQ.6)IMIX(IWD(IAT)=IMIX(IWD,IAT)+IFIX(VAL)
      IF(INUM.EQ.7)INTER(IWD,IAT)=INTER(IWD,IAT)+IFIX(VAL)
      IF(INUM.EQ.8)IRSTME(IWD,IAT)=IRSTME(IWD,IAT)+IFIX(VAL)
      IF(INUM.EQ.10)IATPSD(IWD,IAT)=IATPSD(IWD,IAT)+IFIX(VAL)
      IF(INUM.EQ.11)IDAY(IWD(IAT)=IDAY(IWD,IAT)+IFIX(VAL)
      IF(INUM.EQ.12)TIME(IWD,IAT)=TIME(IWD,IAT)+VAL
      IF(INUM.EQ.13)ICSA(IWD,IAT)=ICSA(IWD,IAT)+IFIX(VAL)
      IF(INUM.EQ.14)LPPAR(IWD,IAT)=LPPAR(IWD,IAT)+IFIX(VAL)
      IF(INUM.EQ.15)IASPAM(IWD,IAT)=IASPAM(IWD,IAT)+IFIX(VAL)
      IF(INUM.EQ.16)LUOUT(IWD,IAT)=LUOUT(IWD,IAT)+IFIX(VAL)
      IF(INUM.EQ.17)TCIST(IWD,IAT)=TCIST(IWD,IAT)+VAL
      IF(INUM.EQ.18)TCILNG(IWD,IAT)=TCILNG(IWD,IAT)+VAL
      IF(INUM.EQ.19)LOOK(IWD,IAT)=LOOK(IWD,IAT)+IFIX(VAL)
      GOTO330
 1000 RETURN
      END
```

e. CALL ROUTINE: HJDATABASE

PURPOSE: Called to obtain a print out of the existing data base.

ATTACHES: HCDATABASE

IS CALLED BY: Operator

FUNCTIONS: Operator must first attach as TAPE 1 the existing data base he wants to print out. Then the operator calls HJDATABASE, ID= . This call routine connects the keyboard and display, attaches HCDATABASE and runs the program. When finished all auxiliary files are returned and the output tape rewound.

```
HJDATABASE

CONNECT, KEYBRD, DISPLY.
ATTACH, CC, HCDATABASE, ID=CARTSV.
CC(TAPE 1, KEYBRD, DISPLY, INPUT, OUTPUT, TAPE 6=OUTPUT)
RETURN, CC, KEYBRD, DISPLY, TAPE 1.
REWIND, OUTPUT
*EOR
*EOF
```

f. CALL ROUTINE: HCDATABASE (Binary File at Program DATA)

PURPOSE: To print data contained in data file.

COMMON BLOCKS: LOG, QUENUM, QUEPNT

CALLS: None

IS CALLED BY: HJDATABASE

LOCAL ARRAYS: None

FUNCTIONS: Displays to the operator a message requesting input as to files to be printed.

Accomplishes printing of file/files to output as requested by operator.

```
      PROGRAM DATA (TAPE1,TAPE2,TAPE3,INPUT,OUTPUT,TAPE6=OUTPUT)
      COMMON /LOG/ IATP(4,30),IASP(4,41),IUNIT(75,69),ITRUCK(560,7),
     Z ITYPE(6,6),IMIX(40,23),INTER(9),IRSTME(20,3),IATPSD(5),
     Z IDAY,TIME,ICSA(20),LPPAR(5),IASPAM(4,20),LUOUT,TCIST,
     Z TCILNG,LOOK(17)
      COMMON /QUENUM/ IHEAD(136)
      COMMON /QUEPNT/ ITEMS(560)
      DATA LOOK /17*0/
      READ(1) IATP,IASP,IUNIT,ITRUCK,ITYPE,IMIX,INTER,IRSTME,IATPSD,IDAY
     Z,TIME,ICSA,LPPAR,IASPAM,LUOUT,TCIST,TCILNG,IHEAD,ITEMS
      WRITE(6,110)
  110 FORMAT(10X,"ARM DATA BASE")
   10 WRITE(3,100)
  100 FORMAT(" ARM DATA BASE PRINT OPTIONS :",/,
     Z "     (1) - PRINT ALL",/,
     Z "     (2) - ATP",/,
     Z "     (3) - ASP",/,
     Z "     (4) - UNIT",/,
     Z "     (5) - TRUCK",/,
     Z "     (6) - REMAINING",/,
     Z "     (7) - STOP",/,
     Z "     ?  ")
      READ(2,*) IANS
      IF(IANS.LT.1.OR.IANS.GT.7) GO TO 10
      GO TO (30,30,40,50,60,70,80),IANS
C**** ATP
   30 WRITE(6,120)
  120 FORMAT(///,26X,"****** ATP  DATA ******",//,11X,"ATP 1",11X,
     Z "ATP 2",11X,"ATP 3",11X,"ATP 4",/)
      DO 20 I=1,30
   20 WRITE(6,130) I,(IATP(J,I),J=1,4)
  130 FORMAT(3X,I2,5X,I6,3(10X,I6))
      IF(IANS.NE.1) GO TO 10
C**** ASP
   40 WRITE(6,140)
  140 FORMAT(1H1,26X,"****** ASP  DATA ******",//,11X,"ASP 1",11X,
     Z "ASP 2",11X,"ASP 3",11x,"ASP 4",/)
      DO 21 I=1,41
   21 WRITE(6,130) I,(IASP(J,I),J=1,4)
      IF(IANS.NE.1) GO TO 10
C**** UNIT
   50 WRITE(6,160)
  160 FORMAT(1H1,31X,"****** UNIT  DATA ******",//,1X,"UNIT",6X,
     Z "TYPE",6X,"ATP",7X,"ASP",6X,"ATP DIST",7X,"ASP DIST",8X,"UTM",
     Z 8X,"JIFFY NAME",6X,"NO. HELO",4X,"PULSE",/,11X,"AMMO",3X,
     Z "WPNS ALIVE",3X,"WPNS SHORT",3X,"RNDS SHORT",3X,"CURRENT",
     Z 4X,"RRL",5X,"CRL",5X,"BAL",3X,"TRK AMMO",3X,"CI SURV",3X,
     Z "SHORT",3X,"TOT RNDS")
      K=1
      L=7
   55 DO 22 I=K,L
      IF(IUNIT(I,1).EQ.0) GO TO 35
      WRITE(6,170) I,(IUNIT(I,J),J=1,7),IUNIT(I,68),IUNIT(I,69)
  170 FORMAT(/,2X,I2,9X,I1,8X,I1,9X,I1,10X,I2,13X,I3,8X,A10,6X,A10,
     Z 8X,I1,9X,I1)
      WRITE(6,180)  (IUNIT(I,J),J=8,67)
  180 FORMAT(12X,I2,8X,I2,11X,I2,9X,I5,7X,I5,3X,I5,3X,I5,3X,I5,2X,
     Z I7,8X,I2,6X,I2,4X,I7)
   35 IF(I.EQ.75) GO TO 57
   22 CONTINUE
      K=L+1
      L=L+7
      WRITE(6,160)
      GO TO 55
   57 IF(IANS.NE.1) GO TO 10
C**** TRUCK
   60 WRITE(6,190)
  190 FORMAT(1H1,29X,"****** TRUCK  DATA ******",//,1X,"TRUCK",5X,
     Z "TYPE",4X,"MISSION",4X,"STATUS,4X,"OWNER",6X,"MIX",6X,
     Z "% LOAD",5X,"LAST FAIL")
      K=1
      L=56
   65 DO 23 I=K,L
      WRITE(6,200) I,(ITRUCK(I,J),J=1,7)
  200 FORMAT(2X,I3,8X,I1,8X,I1,10X,I1,7X,I3,8X,I2,7X,I3,9X,I4)
      IF(I.EQ.560) GO TO 67
   23 CONTINUE
      K=L+1
      L=L+56
      WRITE(6,190)
      GO TO 65
   67 IF(IANS.NE.1) GO TO 10
C**** MIX
   70 WRITE(6,210)
  210 FORMAT(1H1,41X,"****** AMMO  DATA ******",//,1X,"MIX",3X,"1",
     Z 3X,"2",3X,"3",3X,"4",3X,"5",3X,"6",3X,"7",3X,"8",3X,"9",3X,
     Z "10",3X,"11",3X,"12",3X,"13",3X,"14",3X,"15",3X,"16",3X,"17",
     Z 3X,"18",3X,"19",3X,"20",3X,"21",3X,"22",3X,"23",/)
      DO 24 I=1,40
      WRITE(6,220) I,(IMIX(I,J),J=1,23)
  220 FORMAT(2X,I2,23(1X,I4))
   24 CONTINUE
C***" ATPSD
      WRITE(6,230) (IATPSD(I),I=1,5)
  230 FORMAT(/,5X,"****** ATP SERVICE DATA ******",//,5(3X,I2))
C**** DAY,TCIST,TCILNG,TIMD,LUOUT
      WRITE(6,240) IDAY,TCIST,TCILNG,TIME,LUOUT
  240 FORMAT(//,5X,"****** MISC DATA ******",//,5X,"IDAY = ",I1,5X,
     Z "TCIST = ",F7.2,5X,"TCILNG = ",F7.2,5X,"TIME = ",F7.2,5X,
     Z "LUOUT = ",I2)
C"*** ASPAM
      WRITE(6,250)
  250 FORMAT(1H1,26X,"****** ASP AMMO REMOVED ******",//,11X,"ASP 1",
     Z 11X,"ASP 2",11X,"ASP 3",11X,"ASP 4",/)
      DO 25 I=1,20
   25 WRITE(6,260) I,(IASPAM(J,I),J=1,4)
  260 FORMAT(3X,I2,5X,I6,3(10X,I6))
C**** RSTME
      WRITE(6,270)
  270 FORMAT(//,10X,"****** RESUPPLY TIME DATA ******",//,10X,"SETUP",
     Z 10X,"LOAD/100",10X,"TRAVEL",/)
      DO 26 I=1,20
   26 WRITE(6,280) I,(IRSTME(I,J),J=1,3)
  280 FORMAT(4X,I2,4X,13X,I4,13X,I4)
C**** TYPE
      WRITE(6,290)
  290 FORMAT(//,7X,"****** TRUCK SPEEDS, MTBF, AND MTTR ******",//,
     Z 3X,"TRUCK",3X,"2D NT",3X,"2D DAY",2X,"HI NT",3X,"HI DAY",3X,
     Z "MTBF",5X,"MTTR",/)
      DO 27 I=1,6
   27 WRITE(6,300) I,(ITYPE(I,J),J=1,6
  300 FORMAT(5X,I2,4(5X,I3),2(5X,I4))
C**** INTER
      WRITE(6,310) (INTER(I),I=1,9)
  310 FORMAT(1H1,20X,"****** INTERDICTION DATA ******",//,9(5X,I3))
C**** CSA
      WRITE(6,320)
  320 FORMAT(//,5X,"****** AMMO FROM CSA ******",//,9X,"AMMO",11X,
     Z "AMT")
      DO 28 I=1,20
   28 WRITE(6,330) I,ICSA(I)
  330 FORMAT(10X,I2,10X,I5)
C**** LPPAR
      WRITE(6,340) (LPPAR(I),I=1,5)
  340 FORMAT(//,7X,"******* LPPAR ******",//,5X,I2,2(5X,I1),5X,I3,
     Z 5X,I2,///)
      IF(IANS.NE.1) GO TO 10
   80 WRITE(6,350)
  350 FORMAT(1X,"END OF DATA")
      STOP
      END
```

g. PROGRAM: HSREADJIF

PURPOSE: To read Jiffy produce demand files that is provided as input to ARM.

COMMON BLOCKS: None

CALLS: None

IS CALLED BY: HJREADJIF

CALLING PARAMETERS: None

LOCAL ARRAYS: None

FUNCTIONS: Read Jiffy produced binary file.

Provides a means of looking at input generated by the attrition model.

```
      PROGRAM CHECK(INPUT,OUTPUT,TAPIN,TAPE5=INPUT,TAPE6=OUTPUT,TAPE2=TA
     Z    PIN)
      DIMENSION INFILE(64)
    1 READ(2)INFILE
      IF(EOF(2))100,2
    2 WRITE(6,200)(INFILE(I),I=1,26)
  200 FORMAT(/,1X,A10,2X,5F8.3,/,(13X,5F8.3))
      GO TO 1
  100 STOP
      END
*EOR
*EOF
```

h. PROGRAM: HSRDJIFCH

PURPOSE: To enable the operator to change the ammunition expenditure data generated by Jiffy.

COMMON BLOCKS: None

CALLS: INPUT, OUTPUT

IS CALLED BY: Operator

CALLING PARAMETERS: None

LOCAL ARRAYS: FILE (64)--storage for up to 64 words read from the Jiffy produced binary file.

FUNCTIONS: Displays a message to the operator requesting to know what changes are to be made, single field, all of one ammunition type, or all ammunition of all records.

Accepts from operator desired response and displays subsequent to appropriate message.

Allows operator to change the various ammunition expenditures obtained from Jiffy by multiplying expenditures by a decimal factor.

```
      PROGRAM CHANG(INPUT,OUTPUT,TAPIN,TAPOUT,TAPE1=TAPIN,TAPE2=TAPOUT
     *,TAPE6=OUTPUT,TAPE21)
C
C
C     CAN READ,DISPLAY AND CHANGE BINARY INPUT FILE TO ARM.
C
      DIMENSION FILE(64)
C     SET FOR INTERACTIVE USE.
      CALL CONNEC(5LINPUT)
      CALL CONNEC(6OUTPUT)
      N1= 1
      N2= 2
C
1     PRINT*," IF CHANGE IS TO SINGLE FIELD IN 1 RECORD.....ENTER 1"
      PRINT*," IF CHANGE IS TO ALL OF 1 AMMO................ENTER 2"
      PRINT*," IF CHANGE IS TO ALL AMMO OF ALL RECORDS......ENTER 3"
      PRINT*,"    "
      IAMMO = 0
      READ*, IFLG
      IF(IFLG.LT.1.OR.IFLG.GT.3) GO TO 1
      IF(IFLG.NE.2) GO TO 3
C     INPUT AMMO TYPE
    2 PRINT*," AMMUNITION TO BE CHANGED."
      PRINT*,"   "
      READ*, IAMMO
      IF(IAMMO.LT.1.OR.IAMMO.GT.25) GO TO 2
    3 IF(IFLG.EQ.1) GO TO 4
C     INPUT AMMO CHANGE FACTOR
      PRINT *," ENTER FACTOR (DECIMAL (1.5)) TO MULTIPLY BY."
      PRINT*,"   "
      READ *, FACTOR
C     READ RECORDS ADD CHANGE.
4     READ(N1) FILE
      IF(EOF(N1)) 50,5
    5 IF(IFLG.GT.1) GO TO 7
      WRITE(6,100) (FILE(I),I=1,26)
100   FORMAT(/1X,A10,2X,5F8.1,/,(13X,5F8.1))
C
C     NOW MUST DECIDE IF WANT TO CHANGE A FIELD IN THIS RECORD.
C
6     PRINT *," DO YOU WISH TO CHANGE A FIELD IN "
      PRINT *," THIS RECORD (Y OR N)."
      PRINT*,"   "
      READ200,WISH
200   FORMAT(A1)
      IF(WISH.EQ."N") GO TO 10
      PRINT *, " ENTER FIELD NUMBER (2 - 26)."
      PRINT*,"   "
      READ *,IFLD
      PRINT *," ENTER NEW VALUE."
      PRINT*,"   "
      READ *,VALUE
      FILE(IFLD) = VALUE
```

```
        GO TO 6
C       CHANGE RECORD.
      7 DO 8 I=1,5
        IND = 5 * (I-1) + 3
        IF(IAMMO.NE.FILE(IND)) GO TO 8
        FILE(IND+3) = FILE(IND+3) * FACTOR
    8   CONTINUE
C       WRITE OUT RECORD.
     10 WRITE(N2) FILE
        GO TO 4
     50 PRINT*," CHANGE ANOTHER AMMO ? (Y OR N)."
        PRINT*, "  "
        READ 300,IANS
    300 FORMAT (A1)
        IF(IANS.EQ."N") GO TO 60
        REWIND 1
        REWIND 2
        N1= 3 - N1
        N2= 3 - N2
        GO TO 2
     60 PRINT*, " GOOD OUTPUT ON TAPE 21"
        REWIND N2
        DO 99 I=1,999
        READ(N2) FILE
        IF(EOF(N2)) 999,88
     88 WRITE(21) FILE
     99 CONTINUE
    999 CONTINUE
        REWIND 21
        STOP
        END
*EOR
*EOF
*EOR
*EOF
```

i. PROGRAM: TRKQUE

PURPOSE: To enable the operator to put the trucks in their respective queues as part of the initial data base development.

COMMON BLOCKS: LOG, QUENUM, QUEPNT

CALLS: TRKPUT PRINT

IS CALLED BY: HJTRKQUE

CALLING PARAMETERS: None

LOCAL ARRAYS: None

FUNCTIONS: Displays a message to the operator requesting to know if modification of truck queues is desired.

If a positive response is made it calls subroutine TRKPUT which allows modification of the truck queues.

If a negative response is made it asks if a printout of queue contents is desired.

```
      PROGRAM TRKQUE(TAPE1,TAPE2,TAPE3,TAPE4,INPUT,OUTPUT,TAPE6=OUTPUT)
      COMMON /LOG/ IATP(4,30),IASP(4,41),IUNIT(75,69),ITRUCK(560,7),
     Z ITYPE(6,6),IMIX(25,17),INTER(9),IRSTME(14,3),IATPSD(5),
     Z IDAY,TIME,ICSA(14),LPPAR(5),IASPAM(4,14),LUOUT,TCIST,
     Z TCILNG,LOOK(17)
      COMMON /QUENUM/ IHEAD(136)
      COMMON /QUEPNT/ ITEMS(560)
      DATA LOOK /17*0/
      READ(1) IATP,IASP,IUNIT,ITRUCK,ITYPE,IMIX,INTER,IRSTME,IATPSD,IDAY
     Z,TIME,ICSA,LPPAR,IASPAM,LUOUT,TCIST,TCILNG,IHEAD,ITEMS
   10 WRITE(3,100)
  100 FORMAT(" MODIFY TRUCK QUEUES?  (YES/NO)  ")
      READ(2,110) IANS
  110 FORMAT(A10)
      IF(IANS.EQ."NO".OR.IANS.EQ."N") GO TO 40
      CALL TRKPUT
   40 WRITE(3,120)
  120 FORMAT(" PRINT OUT CONTENTS OF QUEUES? (YES/NO)  ")
      READ(2,110) IANS
      IF(IANS.EQ."NO".OR.IANS.EQ."N") GO TO 50
      CALL PRINT
      GO TO 10
   50 WRITE(4) IATP,IASP,IUNIT,ITRUCK,ITYPE,IMIX,INTER,IRSTME,
     Z IATPSD,IDAY,TIME,ICSA,LPPAR,IASPAM,LUOUT,TCIST,TCILNG,
     Z IHEAD,ITEMS
      STOP
      END


      SUBROUTINE TRKPUT
C**** ALLOWS INTERACTIVE TRUCK QUEUE RE-ASSIGNMENT
C**** H. JONES    FEB 79
      DIMENSION INTGR(10), REAL(10), IWORD(10)
C
      WRITE(2,10)
   10 FORMAT(1X,"COMMAND EXAMPLES :",/,
     Z  1X,"GET 3 FROM 35 ",/,
     Z  1X,"PUT 3, 10 IN 105 ",/,
     Z  1X,"LIST 105 ",/,
     Z  1X,"TAKE ALL OUT ",/,
     Z  1X,"END ",/)
C
   15 WRITE(2,20)
   20 FORMAT(" ...   ")
      CALL READF (2, 10, INTGR, REAL, IWORD)
      IF(IWORD(1) .EQ. "END" .OR. IWORD(1) .EQ. "E") GO TO 50
      IF(IWORD(1) .EQ. "PUT" .OR. IWORD(1) .EQ. "P") GO TO 30
      IF(IWORD(1) .EQ. "LIST" .OR. IWORD(1) .EQ. "L") GO TO 40
      IF(IWORD(1) .EQ. "GET" .OR. IWORD(1) .EQ. "G") GO TO 25
      IF(IWORD(1) .EQ. "TAKE" .OR. IWORD(1) .EQ. "T") GO TO 60
      GO TO 15
C
```

```
C**** GET TRUCK FROM QUEUE WITHOUT RE-ORDERING QUEUE
   25 I1 = INTGR(1)
      I2 = INTGR(2)
      IF(INTGR(3) .NE. 0) GO TO 15
      IFLAG = 0
      CALL NXTQUE (IFIRST, I2)
   26 CALL NXTQUE(NTRK, I2)
      IF(NTRK.EQ.0) GO TO 15
      IF(NTRK .EQ. IFIRST  .AND. IFLAG .NE. 0) GO TO 15
      CALL GETQUE(NTRK, I2)
      IF(I1 .EQ. IFIRST) GO TO 15
      IF(I1 .NE. NTRK) CALL PUTQUE (NTRK, I2)
      IFLAG = 1
      GO TO 26
C
C**** PUT TRUCK IN QUEUE
   30 I1 = INTGR(1)
      I2 = INTGR(2)
      I3 = INTGR(3)
      IF(INTGR(3) .EQ. 0) I3 = INTGR(2)
      IF(INTGR(3) .EQ. 0) I2 = INTGR(1)
      DO 35 I=I1,I2
   35 CALL PUTQUE (I, I3)
      GO TO 15
C
C**** LIST TRUCKS IN QUEUE
   40 CALL NXTQUE (IFIRST, INTGR(1))
      IF(IFIRST .EQ. 0) GO TO 15
   42 CALL GETQUE(NTRK, INTGR(1))
      CALL PUTQUE(NTRK, INTGR(1))
      WRITE(2,45) NTRK
   45 FORMAT(1X,I5)
      CALL NXTQUE (INEXT, INTGR(1))
      IF(INEXT .NE. IFIRST) GO TO 42
      GO TO 15
C
C**** TAKE ALL TRUCKS OUT OF QUEUES
   60 CALL SETQUE (560, 136)
      GO TO 15
C
   50 RETURN
      END
      SUBROUTINE READF (LU, NUM, INTGR, REAL, IWORD)
C**** RETURNS UP TO NUM INTEGERS, REALS, AND STRINGS.
C**** BLANKS AND COMMAS ARE DELIMITERS
C**** H. JONES    1979
      DIMENSION INTGR(1), REAL(1), IWORD(1)
      DIMENSION ICHR(82), IALDIG(10)
      DATA IBLANK /" "/, IPERD /"."/, ICOMMA /","/, IMINUS /"-"/
      DATA  IQUOT/1H"/
      DATA IALDIG /"1","2","3","4","5","6","7","8","9","0"/
      ICHR(81) = IBLANK
      ICHR(82) = IQUOT
C
C**** READ RECORD, ZERO OUT OLD INTGR, REAL, IWORD
      READ(LU,100) (ICHR(I), I=1,80)
      IF(EOF(LU) .NE. 0) GO TO 60
      DO 4 I=1,NUM
      INTGR(I)=0
      REAL(I)=0.
    4 IWORD(I) = IBLANK
      KWORD=0
      KINTGR=0
      KREAL=0
      N=0
C
C**** CHECK NEXT CHARACTER IN RECORD
C**** SKIPPING BLANKS **********
   10 MINUS = 1
   11 N=N+1
      IF(N.EQ.81) GO TO 60
      IF(ICHR(N).EQ.IBLANK) GO TO 11
C
C**** DETERMINE IF CHAR IS NUMBER OR ALPHA
      IF(ICHR(N) .EQ. IQUOT) GO TO 41
      IF(ICHR(N) .NE. IMINUS) GO TO 12
      MINUS = -1
      GO TO 11
   12 ISTART = N
      NUMB=0
      IF(ICHR(N).EQ.IPERD) GO TO 28
      DO 15 I=1,10
      IF(ICHR(N).EQ.IALDIG(I)) GO TO 20
   15 CONTINUE
      GO TO 40
C
C**** BUILDING INTEGER OR INTEGER PART OF REAL
   20 N=N+1
      IF(ICHR(N) .NE. IBLANK  .AND.  ICHR(N) .NE. IPERD
     Z  .AND.  ICHR(N) .NE. ICOMMA ) GO TO 20
C
C**** CALCULATE VALUE OF INTEGER
      IEND = N-1
      NUMB=0
      DO 25 I=ISTART,IEND
      DO 24 J=1,9
      IF(ICHR(I) .EQ. IALDIG(J)) GO TO 25
   24 CONTINUE
      J=0
   25 NUMB = NUMB +  J * 10 **(IEND-I)
      IF(ICHR(N) .EQ. IPERD) GO TO 28
C
C**** NUMBER WAS INTEGER, STORE IT, CHECK FOR BLANKS
      KINTGR = KINTGR +1
      INTGR(KINTGR) = NUMB * MINUS
      GO TO 10
C
C**** NUMBER WAS INTEGER PART OF REAL, NOW BUILD DECIMAL.
   28 RNUMB = FLOAT(NUMB)
      ISTART = N+1
      IF(ICHR(ISTART) .EQ. IBLANK) GO TO 39
   30 N=N+1
      IF(ICHR(N).NE.IBLANK .AND. ICHR(N).NE.ICOMMA ) GO TO 30
C
C**** CALCULATE VALUE OF DECIMAL
      IEND = N-1
      IDECPL = 1
      NUMB=0
      DO 38 I=ISTART,IEND
      DO 34 J=1,9
      IF(ICHR(I) .EQ. IALDIG(J)) GO TO 35
   34 CONTINUE
      J=0
   35 NUMB = NUMB +  J * 10**(IEND-I)
   38 IDECPL = IDECPL * 10
C
C**** ADD INTEGER AND DECIMAL
      DECML=FLOAT(NUMB)/FLOAT(IDECPL)
      RNUMB = RNUMB + DECML
   39 KREAL = KREAL + 1
      REAL(KREAL) = RNUMB * MINUS
      GO TO 10
C
C**** BUILDING STRING ALPHANUMERIC
   40 N=N+1
      IF(ICHR(N).NE.IBLANK .AND. ICHR(N).NE.ICOMMA ) GO TO 40
      GO TO 44
   41 ISTART = N+1
   42 N=N+1
      IF(ICHR(N) .NE. IQUOT) GO TO 42
   44 IEND = N-1
      KWORD = KWORD + 1
      LENSTR = IEND - ISTART + 1
      IF(LENSTR .GT. 10) LENSTR = 10
       ENCODE(LENSTR, 90, IWORD(KWORD))  (ICHR(KKK), KKK=ISTART, IEND)
      GO TO 10
C
   60 RETURN
   90 FORMAT(10A1)
  100 FORMAT(80A1)
      END

      SUBROUTINE NXTQUE (ITEM, NUMQUE)
C**** SHOWS NEXT ITEM IN QUEUE (LEAVES IT IN)
C**** H. JONES   FEB 79
      COMMON /QUENUM/ NHEAD(136)
      COMMON /QUEPNT/ IPNT(560)
      ITEM = 0
      LITEM = 0
      IPOINT = NHEAD(NUMQUE)
C
   10 IF(IPOINT .EQ. 0) GO TO 20
      LITEM = ITEM
      ITEM = IPOINT
      IPOINT = IPNT(ITEM)
      GO TO 10
C
   20 RETURN
      END

      SUBROUTINE PUTQUE (ITEM, NUMQUE)
C**** PUTS ITEM IN QUEUE NUMQUE
C**** H. JONES    DEC 78
      COMMON /QUENUM/ NHEAD(136)
      COMMON /QUEPNT/ IPNT(560)
      IOLDH = NHEAD(NUMQUE)
      NHEAD(NUMQUE) = ITEM
      IPNT(ITEM) = IOLDH
      RETURN
      END

      SUBROUTINE GETQUE (ITEM, NUMQUE)
C**** GETS ITEM FROM QUEUE NUMQUE
C**** TO GET TRUCK FROM QUEUE 4 -- CALL GETQUE (N,4)
C**** H. JONES    DEC 78
      COMMON /QUENUM/ NHEAD(136)
      COMMON /QUEPNT/ IPNT(560)
      ITEM = 0
      LITEM = 0
      IPOINT = NHEAD(NUMQUE)
C
   10 IF(IPOINT .EQ. 0) GO TO 20
      LITEM = ITEM
      ITEM = IPOINT
      IPOINT = IPNT(ITEM)
      GO TO 10
   20 IF(LITEM .GT. 0)  IPNT(LITEM) = 0
      IF(LITEM .EQ. 0) NHEAD(NUMQUE) = 0
```

```
C
      RETURN
      END

      SUBROUTINE SETQUE (ITEMS, NUMQUE)
C**** SETS UP NUMQUE EMPTY QUEUES FOR ITEMS.
C**** H. JONES    DEC 78
      COMMON /QUENUM/ NHEAD(136)
      COMMON /QUEPNT/ IPNT(560)
      DO 10 I=1,NUMQUE
   10 NHEAD(I) = 0
      DO 20 I=1,ITEMS
   20 IPNT(I) = 0
      RETURN
      END

      SUBROUTINE PRINT
C**** PRINTS OUT THE CONTENTS OF EVERY TRUCK QUEUE
C**** D. HILLIS APR 79
      COMMON /QUENUM/ NHEAD(136)
      COMMON /QUEPNT/ IPNT(560)
      DIMENSION NTRK(25)
      DO 100 I=1,136
      CALL NXTQUE(IFIRST,I)
      IF(IFIRST.EQ.0) GO TO 50
      DO 90 J=1,25
      CALL GETQUE(NTRK(J),I)
      CALL PUTQUE(NTRK(J),I)
      CALL NXTQUE(INEXT,I)
      IF(INEXT.EQ.IFIRST) GO TO 40
   90 CONTINUE
   40 WRITE(6,200) I
  200 FORMAT(/,5X,"QUEUE ",I3," TRUCKS")
      WRITE(6,210) (NTRK(K),K=1,J)
  210 FORMAT(10(1X,I3))
      GO TO 100
   50 WRITE(6,200) I
      WRITE(6,220)
  220 FORMAT(5X,"NONE")
  100 CONTINUE
      RETURN
      END
```

APPENDIX A

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